

The Iron Age

A Review of the Hardware and Metal Trades.

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The Centennial Medal of Award.

We present herewith two illustrations of the Centennial Bronze Medal awarded to exhibitors. The figure on the obverse side is somewhat conventional, and has done duty on medals of award for many years. The designs grouped about it suggest the arts and industries, and the device on the shield is copied from the great seal of the United States. The figures in the four medallions which break the bordering of stars, typify the four continents, America, Europe, Asia and Africa. The reverse bears the inscription "Awarded by United States Centennial Commission," enclosed in a wreath of laurel. The words "International Exhibition, Philadelphia, MDCCCLXXVI,"

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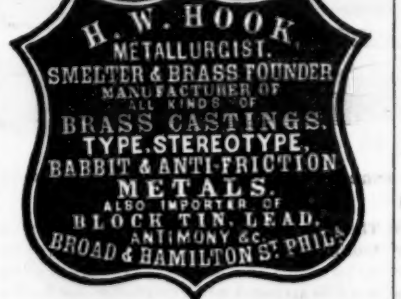
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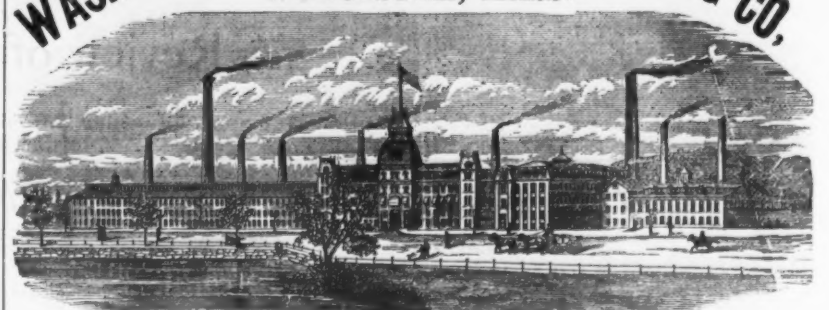
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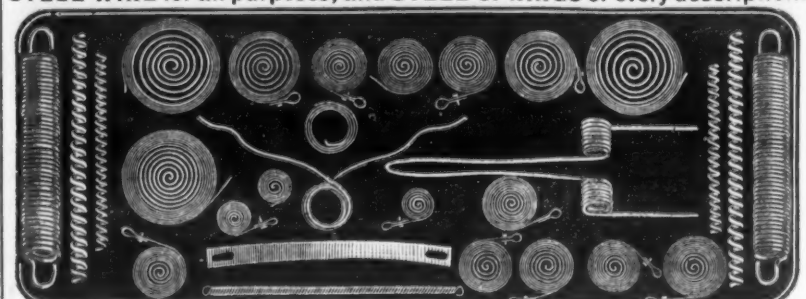
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PERFECT COMBUSTION BY
AN OXYGEN BLAST.

By this process oxygen is imparted to the blast simply by its passage, on its way to the place of combustion,
through a chamber or vessel holding an oxygen compound, from which, by the agitation of the air thereon, oxygen
is set free and thus imparted to the blast. The required volume of this blast is one-half less. The com-
bustion becomes perfect therefrom, all the carbon in the fuel being converted into a high and concen-
trated heat, without smoke or gas, but that of carbonic acid, being formed. Beside a saving of fuel,
obtainable in all cases by this blast, advantages arise from it varying according to the appliance of the heat.
—On Forge Fires it gives a clean and intense heat, free from all sulphurous gas, whereby a better and
quicker welding is had and time saved. On fires under boilers for making steam, the saving in fuel is 25 per
cent. and over, the working capacity can be increased in same ratio by reason of the intensified and accel-
erated combustion, which latter also overcomes the disadvantages connected with the use of fine dust
and impure coal. Castings from a cupola in which the fire is sustained by this blast become of superior
quality, uniformly soft to work and very tough, resembling wrought iron and steel; they forge hot
and cold to some extent; the iron becomes strengthened and purified, being freed from carbon and sul-
phur. For blast furnaces this process becomes of vast importance—it saves fuel, increases the work-
ing capacity, perfects and reduces the cost of the metal, makes sulphurous and other impure ores fit for
use. The serious drawbacks arising from imperfect combustion, caused mainly by otherwise uncontrollable at-
mospheric influences, are overcome. The work of a puddling furnace and that of decarbonizing the iron,
both for wrought iron and steel purposes generally, is much simplified, shortened and perfected as to pur-
ity of product: the work of so many hours is reduced to as many minutes by this process. The process
has the merit of being simple and easily applied, and with but very little expense, and this only for the
needed chamber or vessel and its connection with the blast pipe; the vessel may be a wooden keg, barrel or
larger cask or tank, properly lined, from two gallons for a single forge fire up to 500 gallons and over, according
to the blast in use. The cost of the oxygen is conditioned by, and made subject to, its effect—it is but a small
item compared to the gains from it. Although this process has been in practical use for over a year,
the inventor felt reluctant to offer it to the public before having its utility and practical ability fully estab-
lished, beyond any and all contingencies, not from a theoretical standpoint, but from the testimony of man-
ufacturers who have used the process this last year, and whose standing and reputation as manu-
facturers are of the highest order, and such as to entitle them to the consideration of others. For
further information, and for small specimens of castings from this process, address

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Stationary Steam Engines at the Cen-
tennial.

CHAS. W. ERTVEN & BRO.,
Philadelphia, Pa., exhibit in space B 69, Ma-
chinery Hall, several engines of both horizontal
and vertical patterns, all of which are in opera-
tion. A large horizontal engine of the adjust-
able cut-off class is in use for driving the line
shafting which operates most of the wood
working machinery exhibited, and is conse-
quently subjected to great changes of load.
The design of the combined housing and bed
plate is excellent, being symmetrical, though
massive in appearance, the metal being dis-
tributed throughout in such a manner as will
give the greatest strength and rigidity in resist-
ing the strain to which it is subjected. The
seat to which the cylinder is bolted, the cross-
head guides and the pedestal for crank end
bearing of shaft, are all included in the one
casting which forms both housing and bed
plate, and which gives an unusually large base
upon the foundation. The cylinder is 16 inches
diameter of bore by 42 inches stroke, and car-
ries the steam chest at the back. The throttle
and governor are situated centrally upon the
top of the latter, while the exhaust occupies a
similar position at the bottom. The main valve
is of the ordinary form of slide made without
lap, and operated in the usual manner by an
eccentric, the rod of which is connected di-
rectly to the valve stem. To prevent the vibra-
tions of the eccentric rod from affecting the
latter (a serious defect in the construction of
many engines), a guide is attached, which keeps
it always truly in line. The cut-off valve is
what is commonly known as the Wabash valve,
having been originally designed by Messrs.
Merrick & Son, in 1855, for the United States
steam frigate Wabash, where it was found to
give such excellent results as to lead to its adop-
tion on many screw engines. It is a slide work-
ing on the back of the main valve, having an
adjustable lap and operated by an independent
eccentric. It is composed of two parts, con-
nected by a screw having right and left-hand
threads, and which, passing through a stuffing
box in the end of steam chest, carries a hand
wheel by which it may be turned to right or
left, thus moving the two parts of the valve
from or toward each other, and changing the
cut-off as required. The adjustment may be
accomplished very quickly and by means of a
scale and index attached the exact point of cut-
off is shown. A very excellent attachment to
this engine is a valve operated by a small hand
lever for the purpose of working the engine by
hand. It dispenses with the necessity for un-
hooking the eccentric rod, as is the usual prac-
tice where a starting bar is used, and is a great
convenience in stopping the engine at the
proper point for starting readily or for any
other purpose which requires the piston to beat
a particular point of the stroke. It is, of
course, intended only for heavy engines which
cannot conveniently be moved by hand. All
the working parts of the engine are made heavy
and strong, and it appears to be durable and
capable of the hardest work without sustain-
ing injury. It was designed personally by Mr.
Chas. W. Ertven, and in all novel points is en-
tirely original with him. Independently of the
excellent judgment displayed in the design, the
engine gives evidence of much skill and care
employed in its construction, which, in fact,
may be said of all engines included in the ex-
hibit. A horizontal engine of smaller size,
having a lap valve and no independent cut-off,
is also shown. Two styles of vertical engines
are represented by one of each size built by the
firm, including in the smaller 2 to 15 respec-
tively, and in the larger one of 20 horse-power.
They are strongly built in all their parts, con-
tain all the latest improvements, and in all re-
spects may be compared favorably with the best
makes of their class. This style of engine
seems to be in great favor among parties using
small power, which is pretty good evidence in
their favor.

LOVEGROVE & CO.,
Philadelphia, Pa., exhibit in space D 75 several
sizes of the Whitmore engine, of which they
are the sole manufacturers. An illustrated de-
scription of this engine was published in the
issue of *The Iron Age* of Jan. 27, 1876.

WARD B. SNYDER,
of New York, has a handsome and interesting
exhibit, which attracts considerable attention,
both from its novelty and the elaborate man-
ner in which the space is filled up, as well as the
exquisite finish on the engines included in the
display. An exhaustive article on the subject
of "Small Steam Powers," recently published
in *The Iron Age*, applies directly to the case
of Mr. Snyder's little giant steam engines, and
may be read with interest as well as profit by
those practically interested in the use of power
for light work. The sizes included in the ex-
hibit are 1, 2 and 3 horse-power of several dif-
ferent designs and styles of finish. Several
specimens are plated in gold and silver and in
nickel, and would make very handsome orna-
ments for the parlor. Others are highly fin-
ished in the material contained in the several
parts, while others again have an ordinary finish,
suitable for those who care more for the prac-
tical than the ornamental side of the subject.
Many persons have taken this exhibit to be
models or toys, and are much surprised when
informed that they are intended to be useful as
well as ornamental. In connection with the en-
gines are shown several boilers of suitable sizes
for running the former, and fitted with all
necessary attachments for the purpose of in-
suring economy and absolute safety. The ex-
hibit is located in space south of the Welmer
blowing engine, near the western end of Ma-
chinery Hall.

THE "WELLS TWO PISTON BALANCE ENGINE,"
exhibited by the Wells Balance Engine Com-
pany, of New York, is located in space C 77,
Machinery Hall, where it is represented by a
7x12 inch vertical. This engine is most de-
cidedly a great novelty, and if capable of all

that is claimed for it the invention is one of
great value, from allowing of almost unlimited
speed of piston, a point of the utmost impor-
tance in certain classes of engines, notably loco-
motives and screw propellers. The cylinder is
made twice the length usual for the same crank
radius, and contains two pistons which travel
in opposite directions to each other, or from
center to end of cylinder and return. This is
accomplished by means of any suitable form of
valve by admitting steam between the pistons
at the center of the cylinder, thus driving them
apart toward the ends of the latter; when arriv-
ing at the termination of the stroke in that
direction the steam is admitted at the opposite
side of the pistons forcing them toward each
other at the center. Necessarily the exhaust
takes place at each change of direction, as in
other engines. The outer piston, i. e., the one
farthest from the crank shaft, has one central
rod passing through a stuffing box in the inner
piston, and another in the front cylinder head,
and having the ordinary cross head, guides and
connecting rod for connecting to the crank
pin. The inner piston has two rods equidistant
from center and periphery in a line parallel with
the axis of the crank shaft, each of which has
the necessary connections to crank pin. The
guides for the three cross heads are necessarily
arranged so as to prevent any interference of
the latter with each other in passing. The
three cranks are all in the same plane of the
axis of rotation, and are equidistant from the
latter, the center one (connected to the outer
piston) being at the opposite side from the
outer cranks, thus, in effect, making a two-
handed lever like an auger handle or tap
wrench, and the strain being applied always
in opposite directions is balanced as to its ef-
fect upon the cylinder frame and bearings of
the engine, each piston exerting the same force
on its respective side of the center, and limit-
ing the strain upon the shaft to torsion only.
This is a self-evident fact to anyone
who will give it a moment's thought, but
to convince those who are inclined to be
skeptical on the subject, the engine in
question is run at a speed of about 500
revolutions per minute with the caps off the
journal boxes of the crank shaft, without the
latter showing any tendency to move from its
proper position. To show the speed of which
the engine is capable, Mr. Wells ran it up to
the rate of seven hundred revolutions per min-
ute without shaking or heating any of the bear-
ings, and to judge by its action at that speed
appeared to be limited only by the necessity for
considering the strength of the fly-wheel, the
centrifugal force of which not being perfectly
balanced, rendering it unwise to go beyond that
point. A calculation of the power developed
under the conditions above mentioned, and al-
lowing for 60 lbs. boiler pressure, gave the sur-
prising result of nearly ninety-eight horse-
power. It is claimed by the company that this
engine will perform three times the work of
the ordinary single piston engine of the same
size of cylinder upon a consumption of fuel only
twice as great, or in other words, effect a
saving of 83 per cent. upon fuel, while upon
the cost of the engine the saving would be over
50 per cent. For screw steamers it is claimed
that this engine from its high speed will admit
of a greatly decreased pitch of screw from what
is usually given, thereby greatly diminishing the
percentage of slip, and increasing the vessel's
speed in proportion. There is also in operation,
in Saw Mill Annex to Machinery Hall, a hori-
zontal engine of this type of much larger size,
which is in use for driving one of the large cir-
cular saw mills for sawing heavy timber.

Testing Welded Boiler Shells.

The *Trade Review*, of current date, has a very
interesting article upon the methods now em-
ployed in testing welded boiler seams.

The method of manufacturing boiler shells
with welded seams has led to the construction
of an ingenious machine for testing the sound-
ness of such welds, their adaptation and value
for the purpose in question being of course
primarily dependent on this quality. The au-
thor says: This unique contrivance consists of
a fixed hydraulic cylinder, 12 inches in diameter
and of 12 inches stroke, connected to a travel-
ing head by rectangular wrought iron bars 5
inches by 2½ inches, pierced with center holes
of 11 inches pitch; the platen attached to the
hydraulic ram slides along the bars. This is a
brief explanation of the mechanism devised for
this interesting operation.

When a boiler shell is to be tested the travel-
ing head is run out of the way along the line
of rails, and a shell is run in on a truck; the
head is brought back to its place and the cot-
ters are inserted in the nearest cotter holes.
Pressure is then applied to the cylinder by
means of hydraulic pumps; the ram forces the
platen against the end of the shell, and the
joint is in this way made ready for the testing
process.

The shell is now filled with water from a
tank by means of a flexible hose inserted into
a passage in the platen, while the air escapes by
means of a tube in the traveling head, this
tube being made to slide diagonally, so as to
suit any sized shell; the tube is then closed by
means of a cock, and the test pressure is ap-
plied by the hydraulic pumps. The boiler
seams are welded by means of a gas furnace
placed over them.

Fast Travel.—A correspondent of the
Railway Age says: Eugene No. 193, run by
Ham Clayton, drew Conductor Hall's train on
the Baltimore and Ohio Railroad, from Garrett
City to South Chicago, 131½ miles, recently, in
three hours and twenty minutes. The run
from Millford Junction to Ninety-Second street,
ninety-two and two-tenths miles, with six stops,
was made in two hours and one minute. The
correspondent adds: "Better yet! Eugene
No. 182 on the Baltimore and Ohio Railroad, run
by Frank Simbower, drew train No. 2 with ten
coaches, at a later date, from Garrett City to
South Chicago, 131½ miles, in three hours and
fifteen minutes, making sixteen stops."

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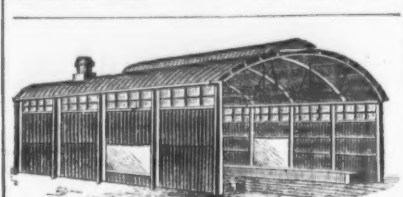
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ceed against any one who may infringe in the future.

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New Patents.

We take from the records of the Patent Office
at Washington the following specifications of
certain patents, lately issued, which will be
found interesting:

IMPROVEMENT IN PROCESSES OF IMPARTING
RESONANCE TO METALLIC ALLOYS.

Specification forming part of Letters Patent
No. 171,969, dated January 11, 1876, issued to
Benjamin Stillman, of New Haven, Conn.

DIVISION A.

This invention relates especially to that class
of metallic alloys known as Britannia, pewter,
and white metal, and composed of tin or other
soft metal hardened by antimony, copper, zinc
and the like, which, as now manufactured, are
notoriously deficient in resonance, giving when
struck only a dull and leaden sound. What-
ever degree of resonance or ring the ingots or
casts of these alloys may possess is entirely
destroyed by the mechanical processes of rolling
or lamination of spinning and striking up,
by which means the products of this industry
are chiefly brought into the desired forms dur-
ing their manufacture. Many attempts have
been made to impart this desirable musical
quality to such wares by changing the propor-
tion of their ingredients, and otherwise, but
hitherto, and until this invention, without suc-
cess.

The process consists in submitting articles of
Britannia, pewter, white metal, and the like,
however the same may be compounded, and
which are destitute of resonance or musical
ring, whether formed by the processes of rolling,
spinning, or otherwise, to the action of a
regulated and well determined temperature,
just short of their melting point, for a brief
but measured time. By this simple process
all vessels of capacity, of whatever form or
dimension, and all other articles of the class
of metallic alloys named, are endowed with
the musical quality so justly esteemed, but
hitherto wanting in these wares, and supposed
to be peculiar to the harder alloys, and which,
until this invention, it has been considered im-
possible to develop in Britannia and other like
alloys.

In carrying out this invention, provide a
bath or vessel of capacity sufficient to accom-
modate the largest articles to be treated. It
may be made of copper or of iron, as may be
most convenient and must be provided with an
easily regulated source of heat, such as is found
in a good gas furnace. This bath may be filled
with either paraffine or a heavy mineral oil,
freed in its manufacture from all the lighter
oils of low boiling point, and capable of with-
standing a temperature of, at least, 500° Fahr-
enheit without boiling.

The oils known as "Downer's Spindle Oil"
and "Merrill's Neutral Heavy Hydrocarbon
Oil," of a density not less than 35° Baume,
fulfill these conditions, and are found in com-
merce.

The temperature of this bath must be raised
to about 230° centigrade, or 428° Fahrenheit,
and then more gradually to about 230° cen-
tigrade, or 446° Fahrenheit—that is, just be-
low the melting point of Britannia, which will
be found to vary as produced by different
makers.

It is quite essential that in every case the
expert using this invention should determine,
by the thermometer, the exact melting point
of his own alloy, and also its temperature of
solidification. It will be found by trial that
these alloys suspended in the bath will endure
a temperature several degrees above what they
can stand if they are permitted to touch the
metallic sides or bottom of the bath. A wire
or rod of metal less fusible than the alloy, if
permitted to touch it when near the point of
its fusion, cuts it like a soldering iron, these
two points being experimentally determined—
viz., the melting point, and, so to speak, the
freezing or solidifying point.

The bath should be kept within, say, 10°
Fahrenheit of the melting point of the alloy,
and the articles to be treated immersed therein
for a brief time, which will vary with the size
and weight of the articles treated. For small
and rather thin pieces 15 to 30 seconds is
a sufficient time. For larger articles of
greater weight, like urns, soup tureens, &c.,
the time may be safely extended to a minute or
more.

Care is requisite in handling objects at this
temperature to support them in a way to
prevent distortion or collapse, for the alloy
when heated to the required degree becomes
very flexible. All contact of the articles with
tools of metal must be avoided beneath the
hot bath.

The time requisite for the treatment of such
articles as are bathed on only one surface
may be somewhat longer than when the im-
mersion is total. Like all other arts of manual
dexterity their treatment is soon learned by an
expert workman. Care is needed to avoid
contact of water, or even of a damp surface,
with the bath at the temperature required,
as the sudden generation of steam might oc-
casion an explosive scattering of the hot bath
with serious effects. It is also desirable that
the bath should be provided with a hood
leading into a well drawing flue, to carry away
the heavy vapors given off during the process.

As the result sought is almost instantaneous,
the expert using this process has it always in
his power to judge if the right degree of ring
or resonance has been attained, and can repeat
the process if found needful. The rapid cool-
ing of the articles after they are withdrawn
from the bath makes no difference either with
their musical resonance or their stiffness, both
which qualities are equally produced by allow-
ing the articles to cool slowly or quickly. If,
however, to save time they are cooled in water,
they must be very thoroughly dried before again
plunging them in the bath.

If any portion of the objects thus treated falls
of being brought up to the proper crystallizing

temperature, the resonance of the articles is
greatly impaired. Such uncrystallized parts
failing to vibrate in unison with the rest, a dis-
cord is produced.

Articles thus treated lose part of the density
imparted by the mechanical pressure of rolling,
&c., but do not become porous like the cast
articles. They also acquire a sensibly increased
stiffness or temper, enabling them the better
to stand rough usage. This important quality
is, equally with the resonance or ring, due to
the molecular rearrangement of the particles in
a crystalline order, imparting a rigidity which
is not found in the laminated and spun metal.

Articles prepared can be soldered, turned,
plated, burnished and submitted to any of the
mechanical processes requisite in their manu-
facture, except those of rolling, spinning, and
the like, without loss of the musical property
imparted by this method of treatment.

Claim.—The process of producing crystalline
rearrangement and musical ring or resonance
in metallic alloys by submitting such alloys to
a regulated temperature just short of the melt-
ing point, substantially as described.

DIVISION B.

Claim.—A new manufacture, possessing the
substantial properties herein described, con-
sisting of articles made from metallic alloys,
known as Britannia, pewter, &c., possessing
resonance from having been subjected to a re-
gulated temperature just short of the melting
point.

IMPROVEMENT IN COMPOSITIONS FOR REPAIRING
CRUCIBLES.

Specification forming part of Letters Patent
No. 177,127, dated May 9, 1876, issued to James
Irwin, of Pittsburgh, Pa.

In the operation of renewing partly worn or
partly burned out crucibles (in metallurgical
operations) various compounds have been em-
ployed. The best results are attained by the
use of a mixture of soda ash, white glass house
sand, old crucibles, and fire-clay. These in-
gredients are pulverized and mixed in about the
following proportions, by measure, viz.: Soda
ash, 2 per cent.; sand, 2 per cent.; old cruci-
bles, 92 per cent.; fire clay, 4 per cent.

The mixture is wet with water to a thick
fluid or semi-fluid consistency, and the cruci-
bles to be treated are then dipped in till, by
one or more dippings, they are coated with the
mixture to the depth of about an eighth of an
inch, more or less; or the mixture may be made
thicker and plastered on. Plaster or apply a
coating of it to such parts of the inside of the
crucible as may be injured by the metal within
or its fluxes. The crucibles, then, when dry,
are ready for use. After being used this coat-
ing readily scales or crumbles off, and the
operation is repeated till the crucible is entirely
burned out or becomes worthless. In this way
it is possible to add considerably to the life of
a crucible at comparatively no expense.

Claim.—A compound consisting of soda ash,
sand, old crucibles, and fire-clay, compounded
with water in about the proportions specified.

Welding Iron.

The following is an abstract of a paper read
by Mr. Richard Howson, of Middlesborough, at
the annual meeting of the Iron and Steel In-
stitute at Leeds. The intention of the speaker
was to combat a misapprehension that a bar or
plate made out of several pieces welded
together is not so good as one made out
of a bloom formed from a single pud-
dled ball. There is an impending change
in the manufacture of finished iron, as
it is admitted on all hands that machinery
will shortly entirely supersede hand labor in
the puddling process. Along with this con-
viction there is a current impression that iron
will have to be puddled in large masses and not
divided into small balls as in ordinary practice
—that the system of piling must be abolished
—that piling means welding and that welding
is a mistake—that homogeneity is the thing to
be aimed at. Now when the matter is fairly
considered, it becomes evident that iron rolled
from a puddled ball is in no case homogeneous,
and that the larger the ball the more hetero-
geneous it is likely to be. The term homo-
geneous can only be strictly applied to iron which
has been melted—such as the mild steel which
is made in Sheffield, containing a low per cent-
age of carbon. When a specimen of material
of this class is treated with acid, there is usually
no appearance of grain. On the other hand,
a piece of ordinary rolled bar, subjected to the
same treatment, shows a fiber which stands out
like whiplash. Its tensile strength is neverthe-
less little, if any, inferior to that of a really
homogeneous bar. We find when a puddled
ball is compressed under hammer or squeezer
it is as essential a process of welding as is that of
a mass of scrap iron. Such being the case,
the more perfectly the cluder is expelled the
nearer we get to homogeneity. The conditions,
however, are in all cases unfavorable to the
complete expulsion of the cluder from the cen-
ter of a puddled ball. There is a good deal of
misconception about the real nature of the
process of welding, and it is well to inquire
what it is, and what means we have at com-
mand for securing efficiency.

When two globules of mercury, immersed in
liquid, are caused to approach, a slight concus-
sion causes them to unite and the liquid be-
tween the two is perfectly expelled. This is an
example of a good weld. A smith of ordinary
skill is able to unite two bars of iron so firmly
as to give way in any other part rather than the
joint, but to do this he has to take the proper
precautions. He has to see that the iron is
sufficiently heated, that the surfaces are pro-
tected from oxidation by means of a flux, and
that the flux is, as much as possible, expelled
in the act of closing up the ends. The natural
flux is, of course, the oxide of iron which forms
on the surface, but this is of an infusible char-
acter, and he therefore assists its fusibility by
the addition of sand. There are, of course,

better fluxes than silica; but sand is cheap, and
it answers every purpose, provided it is used
with judgment, and not in too large a propor-
tion. Its influence is felt from the puddled
ball to the finished bar, in every stage becom-
ing constantly more and more extended, and
so permitting closer metallic contact. If we
trace its course in some processes we meet
with extraordinary results. An armor plate
made at the Atlas Works, Sheffield, was 22
inches thick, and weighed 31 tons. It was
made from puddled balls of the ordinary size,
rolled into puddled bars. These were cut, piled
and re-rolled, and the process was repeated to
the extent of doubling six times. The entire
mass thus comes to consist of no less than
11,488 distinct laminae, and each inch contains
528 such laminae. The area over which the cin-
der contained in the first pile is spread by such
a process becomes enormous, and the metallic
adhesion is proportionately perfect. A piece
of this plate, when polished and treated with
acid, showed a near approach to homogeneity,
and affords a good proof of the efficiency of
welding. The system adopted at Low Moor,
although differing from the above, is essentially
a system in which excellence of quality is at-
tained by exercising precaution in the operation
of welding. In the manufacture of plates, the
puddled balls are here hammered into square
slabs, which are doubled and redoubled till the
requisite weight is arrived at. The final bloom
is then hammered into a slab ready for the rolls,
not however with the laminations horizontal
but vertical. By this means, if there is any
blister or defect concealed in the mass it is sure
to make its appearance at the surface of the
plate when finished. In the manufacture of
bars of best quality the additional precaution
is taken of breaking the first blooms and reject-
ing those which do not present a satisfactory
appearance in the fracture. Referring now to
the difficulty of dealing with large masses, as
compared with what may be called the old-
fashioned systems, it may be urged that the
time has come when not only better iron has
become a necessity, but also cheaper, and that
the best mode of effecting this end is to puddle
on a large scale.

Now the necessity for economy is admitted,
and it is not denied that within certain limits,
in machine puddling, the size of the balls may
be advantageously increased. For instance, in
the manufacture of rails, a very good result
might be attained by puddling in weights equal
to one rail. By transferring the ball to a light
squeezing machine while hot, and then ham-
mering into a bloom, no doubt an excellent rail
might be produced with only twice heating,
employing, at the same time, in great part, ma-
chinery which is already in existence. If, on
the other hand, we have to deal with a weight
of three rails instead of one, it cannot be ma-
nipulated with existing appliances, but it in-
volves the use of new machinery of a much
more costly character, while, if the foregoing
remarks are correct, the risk of defects and
flaws in the finished article is increased. Other
classes of iron need not be specially referred to.
The same general views hold good in every
case. An armor plate of however small dimen-
sions cannot be made out of one ball direct,
because it would arrive at the finishing stage
without having undergone the requisite work
for securing uniformity and soundness. So in
other cases. The supposed homogeneity of the
single ball plan is yet a conjecture, and
likely to prove a fallacious one if pushed too
far, while its economy is more apparent than
real. Granted that machine puddling will be-
fore long entirely supersede hand labor, the
question lies between working on a large scale
and on a comparatively small one. The advan-
tages claimed for the former may be summed
up as follows: A saving in fuel, in labor, in
waste from crop ends and in waste from reheat-
ing. The extent of such saving, however, de-
pends upon the class of manufacture, and in no
case is it very large. On the other hand, we
have the sacrifice of existing machinery and the
expense of erecting new of an expensive class.
We have also an increased liability to loss from
the folding up of raw iron and setting in the
puddled ball, and generally greater difficulty in
obtaining a uniform and reliable product, ac-
companied with more trouble and cost from
wear and tear, and the alarming risk of stop-
pages from the breaking down of gigantic ma-
chinery. We may venture to predict that a
year's experience of the two modes of working
would prove in favor of the smaller furnaces.

Iron Telegraph Poles.

A correspondent of the *Tribune* urges the
claims of iron telegraph poles as follows:

The only change of telegraph wooden poles
thus far suggested is that of putting the wires
under ground. The mechanical and electric
difficulties connected with it are well known to
electricians, and the first cost and the failure
thus far to secure perfect insulation for a
greater period than two or three years effect-
ually deters the officers of any company in
this country from experimenting in it on a
large scale. But the principal difficulty lies in
the fact that whatever is done in New York
will be forced upon the companies by the
authorities of other cities; and at the rate of
\$7 to \$12 per yard, which is the estimated cost
of laying underground cables, there is not
enough telegraphic capital in the country to
lay the enormous number of yards that all the
cities would require.

But I submit that it is far from wise to
abandon the subject entirely. There is cer-
tainly a large measure of relief to be secured by
the use of iron poles; they can be obtained and
used for about one-twentieth of the cost of the
underground plan, and at not very much
more than the wooden poles now used. In
every capital of Europe they are the only "air-
supports" allowed to be erected in the streets;
they possess the merits of being uniform,
stronger, and at least ten times more durable
than wood. A wrought iron pole does not fall;
it bends, slowly and but partially, out of the
perpendicular. It is impossible by any one
accident or force to bring one completely down,
and long before any danger can occur it will
show its weakness so evidently that its use-
fulness to its owner will insure its immediate
repair. But in any event the first move must
be made by the city itself. At least one-half
of the entire number of telegraph poles in New
York belong to the city for its fire-alarm ser-
vice. It seems to me that no easier or more
effective reform can be accomplished than for
the Fire Commissioners providing for the city a
safe, durable and creditable system of iron
poles as a standard and example for the regular
telegraph companies to follow.

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rence..... 1 50
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termine, the charge must necessarily depend
upon circumstances.
For determining the per cent. of Sulphur and Phos-
phorus in Iron or Steel..... 14 00
For each additional constituent of usual occur-
rence..... 6 00
For the per cent. of Carbonate of Lime, and in-
soluble Siliceous Matter in a Limestone..... 10 00
For each additional constituent..... 2 00
For the per cent. of Water, Volatile Combustible
Matter, fixed Carbon, and Ash in Coal..... 12 50
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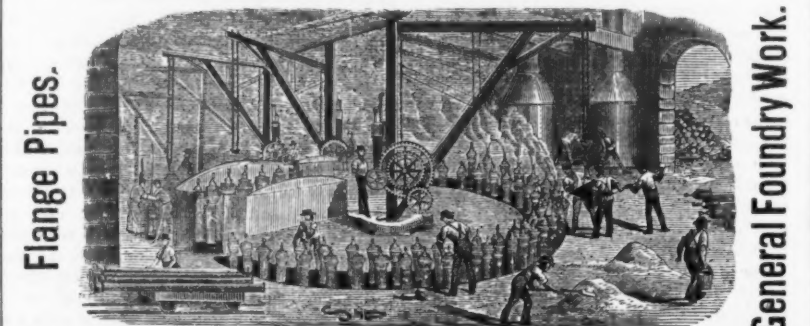
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| Pig Iron | 35,000 " |
| Railroad Iron | 40,000 " |
| Railroad Splices and Couplings | 5,000 " |

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Machinists' Tools at the Centennial.

(Concluded.)

THORNE, DE HAVEN & CO.,

of Philadelphia, Pa., exhibit a number of different kinds of drilling and boring machines, most of which are patented by the firm and constitute their specialty, in the manufacture of which they have been very successful. Probably the most important of these machines are the portable power drills, which supply a long felt want, by obviating the necessity for hand drilling, except in rare instances. They have ample power and speed suitable for the different sizes of drills used, and are capable of performing the work as well and quickly as a stationary drill press. The base of the machine is composed of a hollow column or sleeve, having a foot with necessary provision for clamping to the work in any desired position. On the back of the column is a horizontal sleeve for angles greater than 45°, which (although from the large range of adjustment of which the head is capable, it is not absolutely essential) is preferable on account of its superior rigidity. The column and horizontal sleeve are split longitudinally, and have bolts for clamping on to the post, which holds the latter more firmly than is possible by the use of set screws. The post has ample range of vertical and radial adjustments, and carries at top the radial arm which supports the head. The latter being attached to the arm by a ball and socket joint, has unlimited adjustments for any angle or direction. The driving and cone pulleys are grooved for round belting (preferably of cotton rope), and by a very ingenious though simple device, the machine may be placed in any required position or distance, irrespective of the countershaft. The driving belt is shifted by means of a rope which may be carried to any convenient position within reach from the machine, thus giving the operator as perfect control as would be possible with a stationary machine. The radial arm is adjustable from or toward the post, which permits of several holes being drilled without changing the position of the base. For use on heavy work which requires a great expenditure of time and labor in handling and adjusting under a stationary drill press, this machine appears to be a very valuable improvement, and would soon pay for itself in the time saved by its use. The exhibit comprises all the different sizes built by the firm, having a range of capacity for drilling and boring from the smallest drill up to holes of 8 inches diameter. This machine was awarded the first premium at the Franklin Institute Exhibition in Philadelphia, in 1874. An improved vertical drill press of the column goose-neck pattern is exhibited. The circular table is carried by a radial arm upon the column having the rack and pinion vertical adjustment. The spindle is counterbalanced, and has a quick return motion. The feed is automatic or hand, and has all requisite changes. The driving cone has four speeds and is back geared, making eight changes. The bevel gearing for driving the spindle is inclosed, and all bearings well protected from dirt. The machine is arranged for an overhead counter. The radial drill shown embodies some patented improvements, and has the appearance of a very substantial and efficient tool. The column is bolted to a base plate which has T slots for clamp bolt heads for holding large work. At right angles with the base plate is the table, having a vertical adjustment by rack and pinion, which is operated by a horizontal shaft having a crank at the front of the table, and is connected by means of bevel gears. The table has a vertical surface, provided with T slots for clamping work, and is in many cases a great convenience. The head is moved in or out by a hand wheel operating a rack and pinion. The feed is automatic or hand and has a quick return. The spindle is driven by worm and gear, and the cone—four speeds—has back-gearing and is placed at top of the column, leaving ample space for placing the counter at the bottom and giving the necessary length of belt. The firm also exhibit their patent multiple drilling machine, having a gang of six spindles, each of which has its own independent adjustments, and any or all of them may be used at once, as the character of the work demands. The capacity of the machine is for holes up to 1 inch diameter in wrought iron or steel. The table has ample vertical adjustment, or may be removed entirely, if necessary. A stop gauge for regulating the depth of holes is attached for each spindle, and also a device for spacing and lining rivet holes, &c. Each head has its independent automatic feed, and the spindles can be adjusted vertically to compensate for irregularities in thickness of the work or different lengths of drills. The automatic feed is put in operation by means of a hand lever, which upon being reversed causes the drills to run up clear of the work, when the return motion is stopped automatically. In shifting the work the stops are let into the last holes and insure the following row being drilled perfectly in line with the previous ones, beside spacing them accurately. This machine is designed for use on any kind of work requiring holes to be drilled in long rows, such as boiler plates, ship plates, iron beams, columns, &c., for buildings and bridges. It is undoubtedly a great time saver, beside doing the work more accurately than could be done except through the greatest care by the ordinary method. It is of the most vital importance that all rivet holes, more especially in steam boilers, should be accurately spaced, as by their not coming properly in position, the use of the taper drift pin is necessitated, and the consequence is a dangerous straining and frequently an undiscovered fracture of one or both of the sheets, which must sooner or later show signs of weakness, and frequently produce disastrous results. All the machines in the exhibit of this firm are well built, and as simple in construction as consistent with efficiency in the proper performance of their several functions. The location of the space is Section B, Column 30, Machinery Hall.

C. VAN HAAGEN & CO.,

Philadelphia, Pa. This firm exhibit a number of tools for general shop use, which show a large amount of ingenuity in their construction, and are of great convenience in performing the work for which they were designed. A portable hand drill is shown having automatic feed and quick return motion to spindle. The arm carrying the head is arranged for horizontal and vertical radial adjustments, this combination allowing of the drill being placed in any required position. The post which carries the arm has a slotted foot, and is also furnished with a hinged adjustable clamp for fastening to the work. It is of sufficient length to give ample vertical adjustment. The machine is rated for 1½ inch hole in wrought iron, and it can be arranged for power when desired. A "Bement" column drill press is shown, having Van Haagen's patent attachment for horizontal boring and drilling, and which, when applied to machines having the necessary vertical, cross and longitudinal feeds, may be used for performing a variety of work of such extended range as to render its name—"universal"—not inappropriate. It may be used for shaping, surfacing, milling, horizontal boring and drilling, gear cutting, key seating, &c., &c., all of which operations it performs well and quickly, and without the necessity for complication of parts, which is frequently an objectionable feature of universal machines, which would be more correctly termed combined machines. In this machine, however, the different kinds of work are performed by different combinations of the several functions, which are vertical, transverse and longitudinal screw feeds to table, and a horizontal feed and rotary motion to cutter spindle. The latter carries Van Haagen's patent expansion boring tool, having a cutter in the end of an adjustable arm, either one or two of which latter may be used. Different kinds of cutters (which are made of round bar steel and held by set screws) are furnished to suit the character of the work, i. e., side cutting, as in boring; or end cutting, as in milling, slotting, surfacing, &c. For slotting and key seating the work is performed in a manner similar to the cotter drill, while for surfacing and milling the operation is substantially the same, but a much wider sweep of the cutters is given, the limit being about 10 inches circle. The firm build a machine embodying the different features of this attachment, which is capable of even a greater range of work. A very important tool is an automatic drill grinder, designed especially for twist drills, but capable of performing the work equally well on any form of continuous drill. The great importance of accurate grinding is scarcely appreciated in many shops, but it is, nevertheless, obvious to any mechanic who will give the subject a little thought. By grinding one lip, or cutting edge, of the drill longer than the other, the point is thrown out of center, and the consequence is that the hole is drilled larger than the required size by twice the distance the point varies from the center. This is a very serious feature, as many a piece of work has been "botched" or completely spoiled from this cause. Then, also, it requires great care in grinding by hand to get the same angle to both lips, and as a consequence of any variation in this respect, the lip having the greater angle has all of the work to perform, while the other is merely scraping, or not touching at all. This will account for many a breakage of drills for which there is no apparent cause. Another important point is giving proper clearance to the cutting edge; if too much is given the drill will chatter and work badly, especially just as the point goes through, beside which the lip will be greatly weakened by being deprived of the necessary support from the metal back of the edge and be liable to chip off. If not enough clearance is given the result is that the drill will not cut, or if it does the continuous rubbing develops so much heat from friction as to burn the drill. As Mr. Van Haagen's machine is constructed with a view to performing this work in a manner mechanically perfect, beside doing it very quickly, it is obviously a valuable addition to the outfit of a machine shop. This exhibit is very creditable in point of workmanship, and may be seen in Machinery Hall, Sec. C, Col. 30.

HORATIO L. HOLMES,

of Providence, R. I., exhibits in Space D 7, Col. 47, Machinery Hall, a lathe tool and holder, or substitute for the tool post, of such exceptional merit as to deserve the special notice of mechanics. It is simple and durable, and can be applied to any lathe without any necessity for alteration. The holder, which is a malleable iron casting, is held in position on the rest by a square headed cap screw, and admits of all necessary adjustment. The tools of all shapes required for the many different kinds of work, such as diamond, round and square nosed, cutting off, heading, &c., as well as any special forms for making irregular shapes, are milled to the required form and hardened the entire length, thus making a continuous tool which requires grinding upon the end only, and may be used up to a very short stump, thus effecting a great saving not only in time required for the frequent dressing necessary in using the ordinary forms of tools, but also of material of which they are composed, and obviating the necessity for wasting a large amount of steel in the stump that is always left after the tool becomes too short for use, and which in the majority of shops is very seldom utilized for any other purpose. This waste becomes a serious matter in tools for the heavier lathes, as a very short piece of bar steel of a size suitable for the purpose will weigh several pounds. But the point of economy, although of much importance, is its least point of superiority, as the tool from being free from all rubbing or friction of any kind excepting that which is the unavoidable result or accompaniment of cutting,

allows of much heavier cuts and coarser feed than ordinary practice, and at the same time is less liable to strain the lathe or spring the work. Therefore the time saved through its rapid working constitutes the most important point of superiority. The small cost of this attachment in addition to its real merit should insure its rapid introduction into general use.

COOPER, JONES & CADBURY,

of Philadelphia, exhibit two machines of the present class, which are designed for the use of brass finishers, the manufacture of which forms a special branch of their business. The machines are the inventions of Mr. Cooper of the firm, and embody many improvements for a more perfect degree of accuracy than is usual in this class of work, beside the equally important considerations of durability of the machine and rapidity of operating. The first which we will notice is what is technically termed a Fox lathe. In its design much good judgment has been displayed, the metal in the different parts being so distributed as to give the greatest strength, without marring the symmetry of, or rendering its appearance clumsy. The head boxes are made large and the spindle heavier than ordinary. As the slide rest has both handles at the front, it can be used with the poppet-head close up to the work. Those accustomed to the use of these tools will appreciate this feature as one of the most important improvements ever applied to machines of the kind. The tool rest of the screw chasing apparatus is so constructed that the tool need not overhang the tool post further than the depth of the screw to be cut. It has a cross-adjustment, by means of which the tool can, without being loosened, be brought central with the work, which can be done with the utmost accuracy in a few seconds. The slide of the poppet-head is provided with a stop motion on the cross-feed, which can be thrown in or out instantly. The gearing of the screw chasing attachment is carried by an eccentric stud, which by means of a handle admits of being thrown in or out without stopping the lathe, even when running at a fast speed. The other machine exhibited (also a lathe) has all the features of the one first mentioned, and in addition an attachment by which it may be used as a screw machine of the most improved pattern. A turret-head placed upon the top of the poppet-head carries the dead center and all the necessary tools, and the complete operation may be performed automatically or by hand, as desired. There is also a cutting off rest with two tool posts and the ordinary stop motions. The hollow spindle has a bore of 1½ inch for the reception of large work. In using this machine as an ordinary Fox lathe, the weight of the turret would be a serious inconvenience were it not provided for in a very simple manner. A sliding rack traversing the length of the bed beneath the carriage and poppet-head is operated by a 3 inch pinion, having a hand wheel of 12 inches diameter. By means of a clutch the poppet-head or slide rest may be fastened to this rack, when by turning the hand wheel they are moved with the greatest ease. The leading screw on this lathe admits of chasing screws of 6 inches in length. All the gibbs on both machines are taper, all bearings scraped to perfect surfaces, and the work throughout is first-class in every particular. From their position they might easily be overlooked, and as they are well worth inspection by those interested in the use of such machines, can be found in space Sec. B, Col. 19, Machinery Hall.

The Origin of Electro-Metallurgy.

Mr. Thomas Spencer, of Euston Square, London, claims to be the original inventor of electro-metallurgy. In a letter recently published he says:

Those who wish to see the first electro-plated article—as I suppose it to be—may have their curiosity gratified in the Liverpool Museum, in which there is an electro-plated teaspoon with my initials engraved on it, and the date, May, 1838. This date, be it observed, is above two years in advance of that of the Elkingtons' patent. This spoon, though it was not in the legal sense solid, was thickly covered with silver, and given to my friend, Mr. Joseph Mayer, the eminent silversmith of Liverpool, on the day, as it happened, the date was engraved on it. Its history is briefly this: During my electro experiments Mr. Mayer had frequently seen his results in copper, and naturally became desirous to know how far the art was applicable to the deposition of silver. So for this purpose he sent to me, at my request, a white metal teaspoon, and with it a flattened out Mexican dollar to act as the opposing plate in the small galvanic arrangement I had then in use. Some fortnight after I took it to him, thickly coated with silver, but rough as it came from the trough. I remember it was weighed and found to be about one-quarter ounce heavier than when it was received. The object in putting so much silver on was to test the adhesion of the one metal to the other.

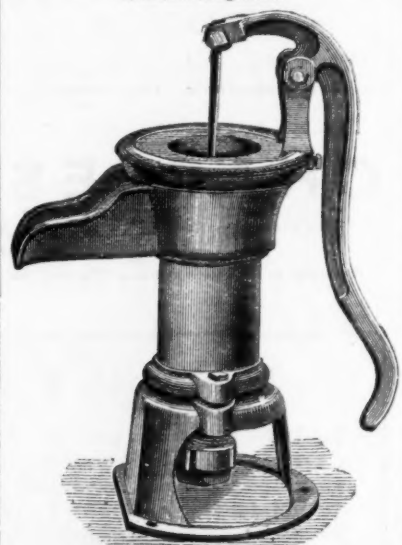
I suggested that the better mode of arriving at this would be to cut into it deeply with a graver, which Mr. Mayer had done accordingly, and on calling on him a few days after I was told it had stood the test I suggested. I then saw that he had got his engraver to put my initials on it with the date.

I had forgotten all about this spoon till my departure from Liverpool in 1851, when, at a public meeting, it was referred to by Mr. Mayer as being in his possession. Since then, being in Liverpool, and going through the vast collection known as the Mayer Museum,—so munificently given by this gentleman to the Corporation—I saw this teaspoon, labelled, in one of the glass cases, as the first specimen of electro-plating, and which I suppose it to be. At all events its date is two years prior to Elkington's patent.

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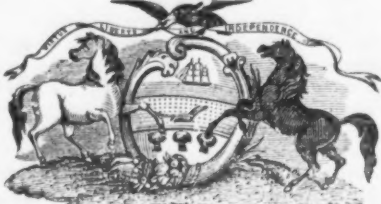
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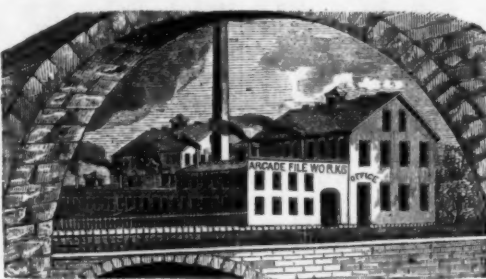


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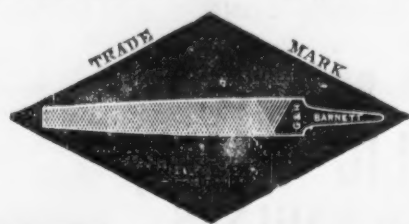
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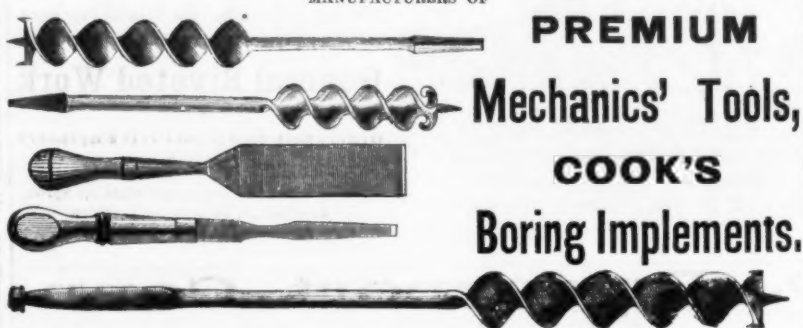
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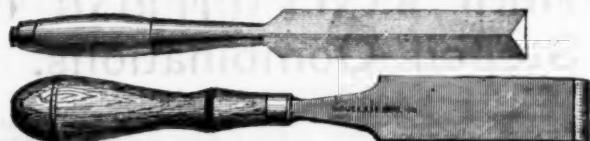
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The only ring that

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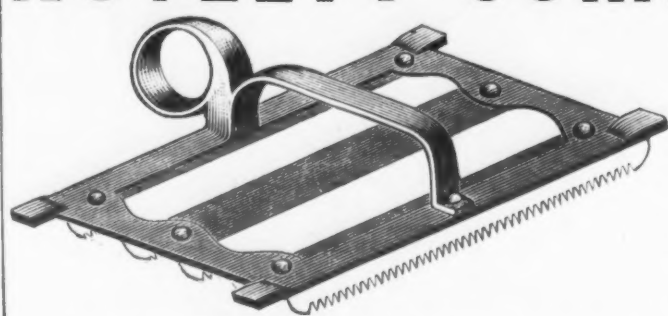
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the nose to keep it

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Any Dealer is aware that in an ordinary Hand Saw, the front cut is the effective cut, and drawing back the Saw has little effect, by reason of the slant edges riding over the fiber as the Saw is drawn back. The difference between the front cut of a Hand Saw, and the back cut, is the difference between the Lightning Saw teeth and all others; for all other saws are set one point and ride on slant edges. By setting two points of *M* the same side, and the next two the other, I conceal the slant between them, and operate wholly by the outside of a nearly vertical *M* tooth. Standing nearly vertical the two points of the *M* occupy the same space as one old *V* tooth. One point only is cutting and the other follows in the slit behind it to cut in the same manner, in the return motion, thus doubling the cut upon the same base and space of tooth. This construction also gives the breadth and durability of nearly an inch of steel instead of a single slender scraping point, and presents the upright instead of the slant edges to the timber. Any one can in a moment test the principle by comparing the front and back cut of any *V* tooth Hand Saw. My new Patent of March 28th, 1876, allows the saw-dust perfect clearance; the arch slightly widening to the points of teeth renders it impossible for green or resinous saw-dust to be retained, while the slightly increased breadth at base of tooth gives the durability so much advocated by parties who have round-edged files for sale. Slightly pyramidal, the outer edges are as upright as the front cut of a Hand Saw, and the back slant cut is concealed in no other saw than mine, by setting the two points of *M* to cut in line instead of alternately. Thus by this new patent I avoid all "overhang or undercut," avoid all tearing, and to the matchless speed of the Lightning dress and set, add the durability, simplicity of sharpening, and sweet cutting so much admired. I thus adapt the Lightning teeth to universal use, in all Hand, Pruning, Buck, and Cross-Cut Saws. The concave in the centre of the *M* saves files, and renders it impossible to file the tooth out of shape. *g. e. r.* A 10 inch Cant File and Set fitting the *M* is furnished for forty cents, that will file ten saws easily.

g. e. r. A 16-inch log was sawed off in 17 seconds by hand with a Lightning Cross-Cut Saw, at Pennsylvania State Fair, on September 30th, 1874, before President Eby; W. B. Lawson, S. S. Hoagland, and other officers of the State Board, timing.

\$1000 challenge to any responsible saw manufacturer, to match the Lightning Saws, in speed of cutting and ease of sharpening. This patent saw tooth has recently been vindicated by U. S. Court decreeing cost and damages for infringements. Beware. **POOR GOODS ARE NEVER IMITATED.**



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TRIAL OF THE IMPROVED LIGHTNING SAW.—The Emperor, Don Pedro, accompanied by Director-General Goshorn, Superintendent Albert and others, visited Machinery Hall, at the Centennial, on the evening of June 8th. Among other things inspected, at the invitation of E. M. Boynton, of New York they witnessed a trial of the new Lightning Saw, patented March 28, 1876. Two men with one of these saws cut off a sound log of gum wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch and other members of the commission witnessed the trial and timed the cutting. The Emperor remarked that was fast, very fast cutting. Last evening the Emperor made another examination of the saw. *Philadelphia Press*, June 30. Boynton's saws were effectively tested before the Judges at the Philadelphia Fair, July 4th and 5th. An ash log 11 inches in diameter was sawed off, with a 4 1/2 foot Lightning cross saw, by two men, in precisely six seconds, as timed by the chairman of the Centennial Judges of class 15. The speed is unprecedented, and would cut a cord of wood in four minutes. The Representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, Prussia, and several other countries were present, and expressed their high appreciation.

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[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]



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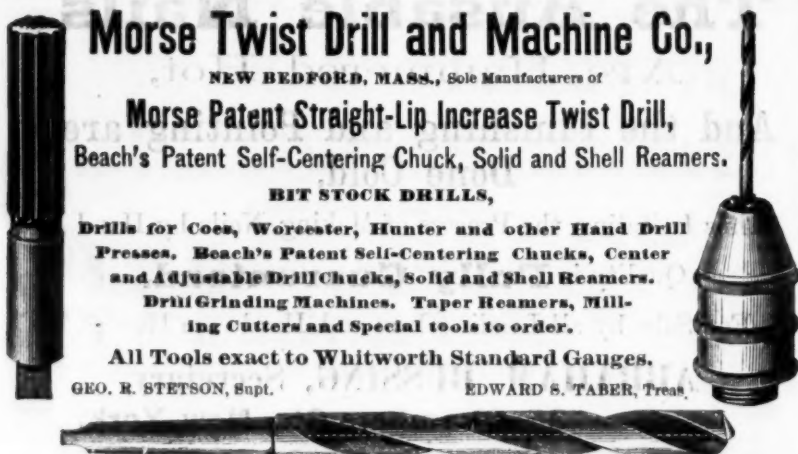


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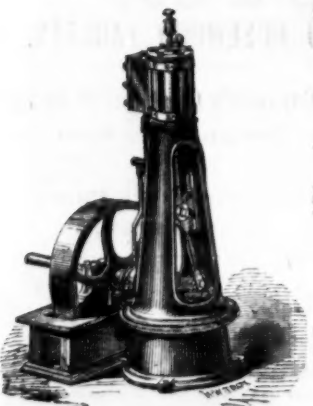
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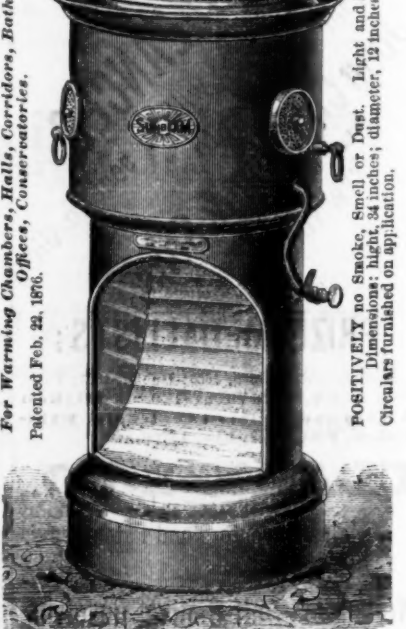
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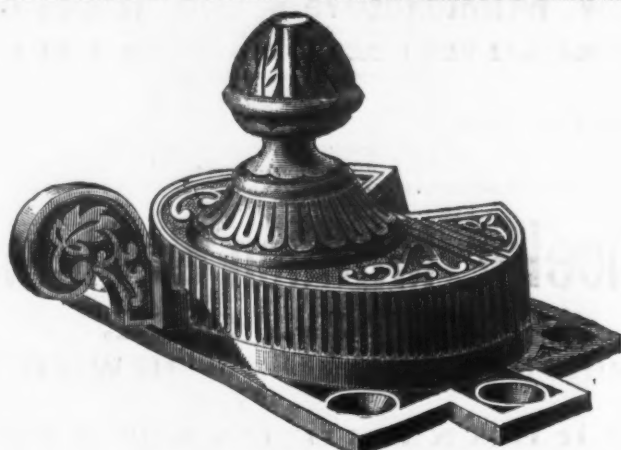
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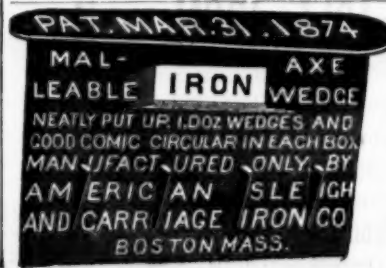
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Platform and every variety of Carriage and Buggy
Springs.
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Any Dealer is aware that in an ordinary Hand Saw, the front cut is the effective cut, and drawing back the Saw has little effect, by reason of the slant edges riding over the fiber as the Saw is drawn back. The difference between the front cut of a Hand Saw, and the back cut, is the difference between the Lightning Saw teeth and all others; for all other saws are set one point and ride on slant edges. By setting two points of any M the same side, and the next two the other, I conceal the slant between them, and operate wholly by the outside of a nearly vertical M tooth. Standing nearly vertical the two points of the M occupy the same space as one old V tooth. One point only is cutting and the other follows in the slit behind it to cut in the same manner, in the return motion, thus doubling the cut upon the same base and space of tooth. This construction also gives the breadth and durability of nearly an inch of steel instead of a single slender scraping point, and presents the upright instead of the slant edges to the timber. Any one can in a moment test the principle by comparing the front and back cut of any V tooth Hand Saw. My new Patent of March 28th, 1876, allows the saw-dust perfect clearance; the arch slightly widening to the points of teeth renders it impossible for green or resinous saw-dust to be retained, while the slightly increased breadth at base of tooth gives the durability so much advocated by parties who have round-edged files for sale. Slightly pyramidal, the outer edges are as upright as the front cut of a Hand Saw, and the back slant cut is concealed in no other saw than mine, by setting the two points of M to cut in line instead of alternately. Thus by this new patent I avoid all "overhang or undercut," avoid all tearing, and to the matchless speed of the Lightning dress and set, add the durability, simplicity of sharpening, and sweet cutting so much admired. I thus adapt the Lightning teeth to universal use, in all Hand, Pruning, Buck, and Cross-Cut Saws. The concave in the centre of the M saves files, and renders it impossible to file the tooth out of shape. A 10 inch Cant File and Set fitting the M is furnished for forty cents, that will file ten saws easily.

A 16-inch log was sawed off in 17 seconds by hand with a Lightning Cross-Cut Saw, at Pennsylvania State Fair, on September 30th, 1874, before President Eby; W. B. Lawson, S. S. Hoagland, and other officers of the State Board, timing.

\$1000 challenge to any responsible saw manufacturer, to match the Lightning Saws, in speed of cutting and ease of sharpening. This patent saw tooth has recently been vindicated by U. S. Court decreeing cost and damages for infringements. Beware.

POOR GOODS ARE NEVER IMITATED.



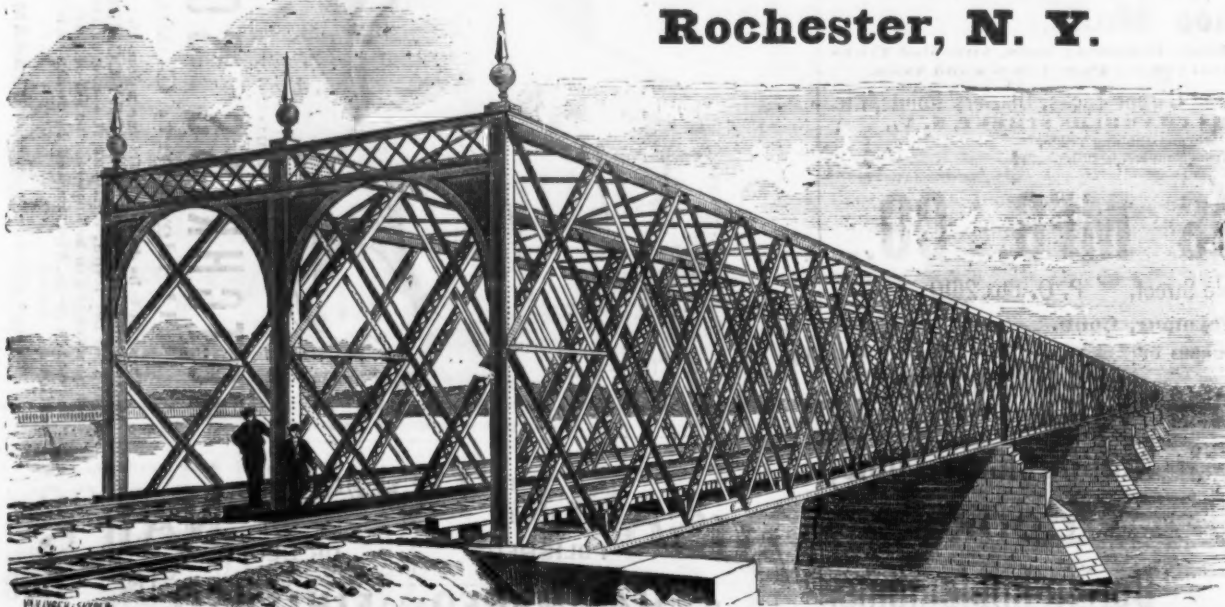
STORE AND WAREHOUSE, No. 80 Beekman Street, N. Y. PHILADELPHIA OFFICE, near Corlies Engine, Machinery Building, Centennial.

TRIAL OF THE IMPROVED LIGHTNING SAW.—The EMPEROR, DOM PEDRO, accompanied by Director-General Goshorn, Superintendent Albert and others, visited Machinery Hall, at the Centennial, on the evening of June 18th. Among other things inspected, at the invitation of E. M. Boynton, of New York they witnessed a trial of the new Lightning Saw, patented March 28, 1876. Two men with one of these saws cut off a round log of gum wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch and other members of the commission witnessed the trial and timed the cutting. The Emperor remarked that was fast, very fast cutting. Last evening the Emperor made another examination of the saw. — *Philadelphia Press*, June 20.

Boynton's saws were effectively tested before the Judges at the Philadelphia Fair, July 6th and 7th. An ash log 11 inches in diameter was sawed off, with a 4 1/2 foot Lightning cross saw, by two men, in precisely six seconds, as timed by the chairman of the Centennial Judges of class 15. The record is unprecedented, and would cut a cord of wood in four minutes. The Representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, Kugland, and several other countries were present, and expressed their high appreciation.

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[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]

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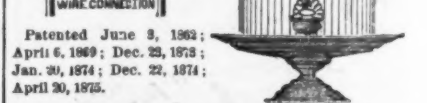
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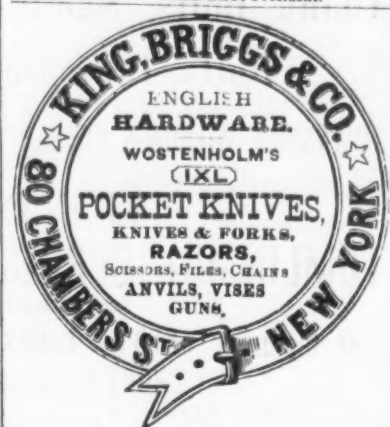
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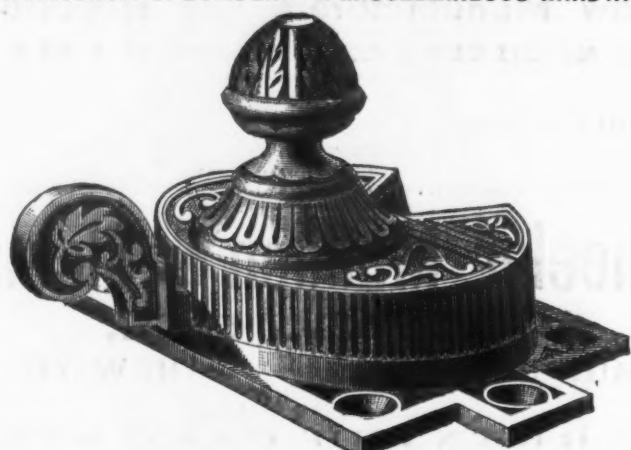
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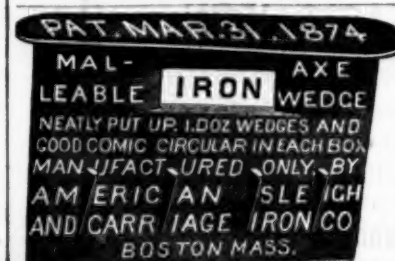
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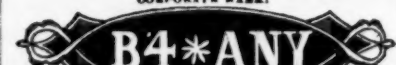
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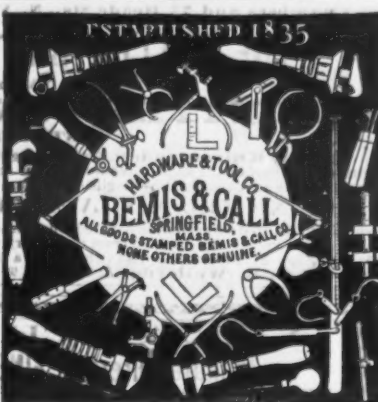
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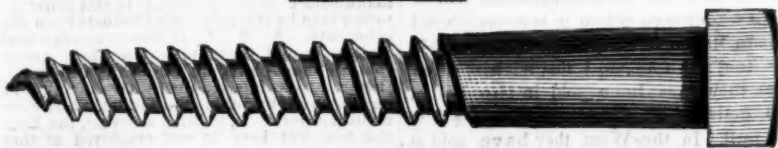
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The blast furnace table, published in our issue of September 28th, makes a showing of the anthracite furnaces in eastern and middle Pennsylvania that is anything but satisfactory. Of the 161 furnaces in the sections named, but 54, or between 33 and 34 per cent., were in blast on the 1st of September. This is 2 or 3 per cent. more than the average for the country, but the anthracite furnaces of Pennsylvania, with the proximity to the fuel used, should make a much better showing than this, and the indications are that by the time of our next report a larger per cent. will be in blast. The reports we are daily receiving from the eastern part of Pennsylvania leave no doubt that in that section, at least, there is a decided belief that the reaction has come. As will be seen by our "Business Items," ore banks that have been idle are being reopened, and those that have not suspended are showing signs of increased activity. Collieries are resuming work full force and full time, and blast furnaces are being put into blast. The action of the Thomas Iron Company in this particular is significant. This company has generally the reputation of running its furnaces in accordance with the state of the trade, blowing when the demand seemed to warrant, and blowing out when it would not. For months they have been running light, but now they have six out of their eight anthracite furnaces in blast, and it is reported that the other two will soon be running. This seems to indicate two things: one, that pig iron can be made

In regard to the present cost of making pig we have the figures of the Thomas Iron Co., for December, 1875. The works are well known as the largest and among the best conducted in America. The company mines its own ores; works low grade ores (average of five years, 41.6 per cent.); has short transportation for fuel and ores (average 30 to 35 miles); smelts with anthracite coal; uses large furnace, "with all modern improvements," a very hot blast (900° Fah.) and high pressure; has produced on a long average, 33 per cent. of No. 1 X, 28 per cent. No. 2 X, 31 per cent. No. 2, and 8 per cent. No. 3. The cost of the ore includes not only the mining expenses, but also a royalty of 25 cents per ton for brown hematite, and 50 cents a ton for magnetite. The item of labor includes also repairs and the cost of blowing in and out. In December, 1875, the total cost per ton was \$20.32, made up as follows: Coal,

This does not mean exactly what it may seem to mean on first reading. The idea of "retaliation" does not enter into the reasons why the English manufacturers desire protection. It is simply a movement inspired by the instinct of self-preservation. They are feeling the effects of American competition at home and abroad to an extent which fills them with serious forebodings of the future. They may not be ruined by it, but they are already crippled by it. In looking over a recent issue of one of the leading British engineering journals, we find the displayed cards of 17 prominent firms advertising American

These two quotations, which guardedly and reluctantly admit facts which were carefully concealed until they became matters of common talk in trade circles, show what is the motive which actuates the Sheffield manufacturers in seeking to secure the imposition of a tariff on American goods brought into Great Britain and her territories. They want "protection." It would be humiliating to confess it, after all they have said about the folly and wickedness of our tariff policy, so they put it on the ground of retaliation. "The American government has done us vast injury," say they, "by protecting Ameri-

"can manufacturers until they have met the wants of their own market and are reaching after ours. Let us retaliate by a tariff for our own protection."

The manufacturers of Sheffield are not the only ones in Great Britain who are beginning to feel that a little protection just now would be a good thing for British industry. The paper makers, the sugar refiners, the cotton manufacturers and many others are clamoring for protection, and appeals to the Home Office for some form of protection against foreign competition are matters of almost daily occurrence. It is not probable that the British government will take any action in the matter until forced to it by pressure of public opinion. The "traditional policy" of free trade will not be abandoned so long as the classes which now govern the country continue in power. It is quite certain that the people of this country will never trouble themselves in the matter, and that we shall not seek to influence either legislation or public opinion on the subject. They will best promote our interests by adhering to the free trade idea, and we shall neither send money, tracts nor missionaries to convert them to our own way of thinking. We would suggest, however, that if any of our discomfited and unhappy Sheffield competitors should decide to follow the examples of the Sandersons, and come here to regain the trade they have lost, they will receive a hospitable welcome and find better opportunities for the investment of capital than are now offered in the manufacturing districts of England.

The proposal of the Reading Railroad Company to attempt the exportation of anthracite coal to South America and other countries now largely supplied by England, is regarded with much favor by the people of Pennsylvania. It will probably have the effect of considerably increasing the commercial importance of Philadelphia, and will also relieve the market and enable the great mining and carrying companies to employ more fully their facilities, and to earn larger aggregate profits. We do not believe, however, that such a trade would be permanent, nor that it would be of benefit to the country. Anthracite coal can only be considered in the light of a national luxury, since the regions in which it is found are comparatively limited, and the supply will doubtless be exhausted long before our other coal fields are fully developed. The deposits of anthracite are very insignificant when compared with the area of the soft coal fields, and the time must come when its use will be confined to the household. While it is not probable that anything like an anthracite famine will be experienced by this generation, the time when the field will be exhausted is not a matter difficult of computation. The home consumption is increasing in an exceedingly rapid ratio, and in the future will be still more rapid. As a fuel for the household it has no equal; for manufacturing and steam purposes it is by no means equal to many other kinds. Under these circumstances, the interest of the nation is to keep this valuable fuel for home consumption. A foreign demand will one of these days have to be supplied at the expense of reducing home consumption. In this matter it will not answer to look only at present time and our immediate wants, because in this thing a small beginning is likely to become before many generations are past a very serious national evil. We cannot, however, expect that a corporation with a diluted capital, an enormous debt and a large annual interest and dividend account to settle, will look at this question from any but a selfish standpoint. If they can make a present profit, the future may take care of itself.

The Additional Awards.

We give below a selection from the official list of "Additional Awards" of the names of exhibitors showing articles of interest to our readers. The "Motives" have not yet reached us. We hope to have them in time for our next issue:

Group I.

George W. Gordon, Boston, Glass Sand. Hampton, Cutter & Sons, Woodbridge, N. J., Clay. J. Kolnigsberg, Huntingdon, Pa., Coke Oven. Mahoning Valley Cen. Association, Youngstown, Coals, Iron Ores and Pig Iron. Hanging Rock Iron Region, Portsmouth and Iron, Pig Iron. Virginia District, Iron Ores. Huntingdon and Broad Top Coal and Iron Region, Coals, Coke, Iron Ores, etc. State of Tennessee, Iron Ores. State of Indiana, Coals, Iron Ores, Malleable Castings. New York Section, Iron Ores. State of Maryland, Mineralogical and Geological Collection. Illinois Industrial University of Natural History, Lead Ores. State of Missouri, Collection of Ores. Lake Superior District, Iron Ores. Territory of Arizona, Silver, Lead and Gold Ores. State of Pennsylvania, Bituminous Coals. State of Pennsylvania, Semi-Bituminous Coals. State of Pennsylvania, Anthracite Coals. State of Ohio, Coals. State of Kentucky, Coals. Providence Franklin Society, Providence,

Minerals and Geological Specimens from Rhode Island. State of Iowa, Geological Collection. Virginia Mining Bureau, Virginia, Collection of Ores. Geological Survey of New Jersey, Geological Collection. State of Wisconsin, Collection of Minerals, Rocks, etc. State of Arkansas, Mineralogical Collection. Geological Survey of Kentucky, Geological Collection. Geological Survey of Pennsylvania, Geological Collection, etc. State of Nevada, Collection of Ores and Stamp Mill. Territory of Montana, Silver, Lead and Gold Ores. State of Michigan, Collection of Ores. State of Colorado, Lead, Silver and Gold Ores. State of Delaware, Mineralogical Collection. State of Missouri, Iron Ore. Lehigh Valley Region, Pig Iron. State of Kansas, Geological Collection. Smithsonian Institute, Ores and Minerals. Marietta, Pittsburgh and Cleveland Railroad, Coals and Iron Ores. Selma, Rome and Dalton Railroad, Coals and Iron Ores. South and North Railroad of Alabama, Iron Ores and Geological Sections. St. Louis, Iron Mountain and Southern Railroad, St. Louis, Collection of Ores. Chattanooga Map Co., Chattanooga, Map of Mineral Region around Chattanooga. State of Iowa, Coals. State of Kentucky, Coal and Iron. Smithsonian Institute, Collection of Ores. State of West Virginia, Geological Collection.

Group II.

Dixon Crucible Co., Jersey City, Graphitic Crucibles. J. H. Garretson, Richland, Iowa, An Impact Brick Machine. Michael Ehret, Jr., Philadelphia, Granulated Slag Roofing.

Group III.

Waggoner, Gifford & Co., Chicago, Mixed Paints. Page, Kidder & Fletcher, New York, Coal Tar Products. Edward Coe, New Haven, Conn., Automatic Electric Gas Valve. Andrew O'Neill, Ansonia, Conn., Gas and Water Main Connector. Thomas Rowland, Brooklyn, N. Y., Steam Stoker. Excelsior Gas Machine Co., South Norwalk, Conn., Maxim Gas Machine. Morris, Tasker & Co., Philadelphia, Gas Works Machinery. A. W. Rand, Philadelphia, "The Victor Gas Machine." Gilbert & Barker, Springfield, Mass., "Springfield Gas Machine." Y. D. Townsley, Cincinnati, Gas Machine. Improved Stelner Gas Machine Co., Philadelphia, Portable Gas Machine. Novelty Gas Machine Co., Baltimore, Carbureting Gas Machine. F. S. Pease, Buffalo, N. Y., Lubricating and Improved Machinery Oils. Joseph H. Adam & Son, Peekskill Mfg. Co., New York, Sugar Mills.

Group VII.

Z. Cobb & Sons, Wilmington, Del., Furniture and Door Springs. J. C. Anderson, Pittsburgh, Sash Balance. American Machine Co., Philadelphia, Wringing Machine, Fluting Machine.

Group IX.

Dorman Bros., & Co., Philadelphia, Power Carpet Loom. R. Parkhurst & Co., Newark, N. J., Burring Machines.

Group XI.

Meriden Britannia Co., West Meriden, Conn., Silver-Plated Goods.

Group XIV.

Peter Carrigan, Philadelphia, Plumbing, Copper Work, Bath Tubs, Food Tins, Links, Copper Kitchen Utensils. Providence Gas Burner Co., Providence, R. I., Gas Burners, Drop Light Sockets, etc. Woods, Sherwood & Co., Lowell, Mass., Tin-plated Ware. Cornelius & Sons, Philadelphia, Gas Fixtures. Wilhelm & Newman, Philadelphia, Post Lamps, Silvered Mica Reflectors. F. H. Lovell & Co., New York, Drummond Kerosene Burner, Centennial Chimney and Felt Wick. Bradley & Hubbard Mfg. Co., Gas and Oil Fixtures and Lamps. Archer & Panoceast Mfg. Co., New York, Gas Fixtures. C. F. A. Heitrichs, New York, German Student Lamps. C. L. Hayward and J. M. Bruce, Boston, Vesper Elevating Street Lamp Post. Christoph Reissner & Co., New York, "Summer Queen" Oil Cook Stove. Open Stove Ventilating Co., New York, "Fire on the Hearth" Parlor Stove. Richardson, Boynton & Co., New York, Boynton's Open Franklin "Tile" Portable Stove. Mrs. Charlotte H. Sterling, Gambier, Knox county, O., Dish Washing and Drying Machine, for washing and drying dishes without the wetting of the hands or the use of a brush or cloth of any kind. Lalauze & Grosjean, New York, Sheet Metal Culinary Utensils, Stamped or Pressed from Iron, Brass, Copper and Tin Plates, etc. J. Hall Robinson & Son, Philadelphia, Coffee, Tea and Spice Caddies and Scales, Safe Deposit, Boxes for Banks, Security Companies, etc. L. F. Dupaignet & Huot, New York, Imperial French Cooking Range, Imperial Maracaibo Coffee and Tea Urns, Copper Ware and Cooking Utensils, etc. Ansonia Brass and Copper Co., New York, Patent Spur, Brass Kettles. Charles F. Herris, Philadelphia, Adjustable Elbow for Stove or Heater. Corrugated Elbow Co., New York, Corrugated Sheet Metal Elbows, made from one piece, for stove and other pipes. Missouri Valley Novelty Works, St. Joseph, Mo., Combination Kitchen Safe. Fuller, Warren & Co., Troy, N. Y., Stoves, Furnaces, Ranges, etc. R. F. Sturtevant, Boston, Machine for drying lumber, brick, wool, cotton, cloth, hosiery, corn and other grains, leather, glue, tobacco, etc., and for heating and ventilating public buildings, manufactories, etc. John Grosjean, Cincinnati, Patent School House Ventilating Stove. The Odorous Excavating Apparatus Co., Baltimore, Machine for the emptying of vaults, stinks, cesspools, etc., without offence. Charles Burroughs & Co., Philadelphia, Gas Cooking Stoves, Reflecting Parlor Gas Stoves, Gas Heating Stoves. Cooper, Jones & Cadbury, Philadelphia, Water Closets, Compression Faucets, Pumps, Fountain Jets, Water Goggles, etc. J. D. Cook, Toledo, O., Water Tank for public water supply, Auxiliary Stand Pipe, for the

service, to obviate the use of portable engines. David W. Law, Gloucester, Mass., Ice Crusher. Thomas S. Dixon & Sons, Philadelphia, Grates, Gas Lugs. Bissell & Co., Pittsburgh, Isaac Dupps' Patent Railroad Car Heaters. J. Reynolds & Son, Philadelphia, Shaking and Clinker Cutting or Grinding Grate, for house warming furnace or apparatus. Bissell & Co., Pittsburgh, Pittsburgh Elevated Oven Cooking Ranges. Bissell & Co., Pittsburgh, Peerless Radiating Shaking Grate. Henry C. Meyer & Co., New York, The Fuller Patent Faucet. Johnson, Black & Co., Erie, Erie county, Pa., Radiant Home Base Burning Stoves, Radiant Home Furnace. Dr. David B. Sturgeon, Toledo, O., American Depurating Bath. Swift, Quimby & Perry, Troy, N. Y., Empire Heating Range. Hitchcock Lamp Company, Watertown, Jefferson county, N. Y., Mechanical Lamp. Geo. Wagner, Washington, D. C., Ventilator. J. W. Bartlett, New York, Improved Street Lamps. Globe Gas Light Co., Philadelphia, Self Gas Making Street Lamps. H. H. Doty, Norfolk, Va., Kerosene Burners, Edward Miller, Meriden, Conn., Lamps and Lamp Trimmings. Mitchell, Vance & Co., New York, Gas Fixtures and Ecclesiastical Ware. Walton Bros., New York, Noiseless Open Base Steam Radiator and Ship's Galley. Walton Bros., New York, Lanterns. Mt. Washington Glass Works, New Bedford, Mass., Crystal Chandeliers, Opal Lights, Globes and Shades, etc. Smith Bros., New Bedford, Mass., Glass Shades and Globes. Magee Furnace Co., Boston, Stoves, Ranges and Furnaces. Tatham & Bros., New York, Tin-lined Iron Pipe, Tin-lined Lead Pipe, Black Tin Pipe. Wm. Page & Co., Boston, Railway and Steamship Lamps. S. A. Wight, Philadelphia, Ventilator and Dust Trap. Baker, Arnold & Co., Philadelphia, Gas Fixtures. J. C. Bates, Philadelphia, Ventilators. August Wilhelm, Philadelphia, Ceiling Reflector. Protective Ventilator Co., New York, Ventilators. Cleveland Non-Explosive Lamp Co., Cleveland, O., General Kerosene Goods, Metallic Safety Lamps and Nickel-plating. Babbington, Boynton & Co., Rhode Island, Crystal Fire Place Heater. Otto Zwietsch, Milwaukee, Wis., Crystal Faucet, Drought Apparatus. Dreer, Smith & Dreer, Philadelphia, Bedford Gas Sunlight Apparatus. American Reflector Co., Philadelphia, Metallic Reflector. Richardson, Boynton & Co., New York, Improved Gas-tight Furnace. Richardson, Boynton & Co., New York, Baltimore Fireplace Heater. C. A. Blessing, Philadelphia, Copper Bath Tubs. C. A. Blessing, Philadelphia, Combination Cook for Bath Tub. Jonathan Miller, Meriden, Conn., Coffee, Tea and Extract Press. Job Bartlett & Sons, Philadelphia, Wrought Iron Warm Air Furnace. C. W. Packer, Philadelphia, Ice Cream Freezer. Reading Hardware Co., Reading, Apple Parer. Job Bartlett & Sons, Philadelphia, London Kitcheners and Charcoal Boilers. Dr. G. W. H. Calver, Columbus, N. J., Household Ironing Machine. A. G. Meyers, New York, Field's Flush Tank. Alex. M. Leslie, New York, Zero Refrigerators. F. J. Walker, M. D., Philadelphia, Water Filter.

Group XV.
Stafford Mfg. Co., New York, Stencils and Key Rings. W. J. Flaugin & Co., Philadelphia, Samson Wrenches. E. Mills & Co., Philadelphia, Brace Bits, Saw Pads, Screw Drivers. American File Co., Philadelphia, Machine-made Files and Hand-cut Rases. F. H. Evans, New York, Expansion Bolts. Alex. Krumbhaar, Philadelphia, Files and Rasp.

Group XVI.
Lafin and Rand Powder Co., New York, Magnetic Electric Blasting Machine. Lafin and Rand Powder Co., New York, Frictional Electric Blasting Machines.

Group XVII.
Benezet & Co., Philadelphia, Carriage Springs.

Group XIX.
The Delaware Iron Ship Builders, Chester, Pa., Model of Steamships. John Englis & Son, Brooklyn, N. Y., Models and Calculations of Steamships. The Rider Life Raft Co., New York, Two Life Rafts. Thos. F. Royland, Green Point, L. I., Iron Buoy. Frank G. Fowler, Bridgeport, Conn., Steam Steering Propeller.

Group XX.
A. Gawthrop & Son, Wilmington, Del., Glass Models of Hydraulic Rams. Union Brass Works, Powell & Co., Cincinnati, Lubricators, Valves, etc. McNab & Harlin Mfg. Co., New York, Valves, Cocks, Whistles, Water Gauges. R. T. Houghton, New York, Boiler and Tube Compound for Removing and Preventing Scale. Rider, Wooster & Co., Walden, N. Y., Compression Engines, Operating with Valves, using Compressed and Heated Air. George Draper & Son, Hopedale, Mass., Self-Lubricating Box. Christopher Brown & Co., Fitchburg, Mass., Steam Engine. John T. Shuster, Philadelphia, Felting for Boilers and Steam Pipes. C. M. O'Hara & Co., Boston, Felting for Covering Steam Boilers and Pipes. Isaac U. Forbes, Philadelphia, Steam Engine Valves and Gear. John McConn, Philadelphia, Hot Water Boiler and Steam Radiator for Heating Purposes. J. B. Hoyt, New York, Furnace for the Combustion of Bituminous Coal. E. A. L. Roberts, Titusville, Pa., Steam Engine. Knickerbocker Ice Co., Philadelphia, Ice Tools, Elevators and Ice Machinery. Gould Mfg. Co., Seneca Falls, N. Y., Hand Fire Engine. B. S. Nichols & Co., Burlington, Vt., Vertical Steam Fire Engine. New York Belting and Packing Co., New York, Rubber Belting, Packing, Hose, etc. Hubbard & Aller, Brooklyn, N. Y., Steam Pumps. Colwell Lead Co., New York, Lead Pipe, Block Tin and Tin-lined Lead Pipe. Henry Q. Hawley, Albany, N. Y., Water Motors. Crane Brothers, Chicago, Model of Hydraulic Elevator. Isaac Hyneman, Philadelphia, Water Excavator. W. D. Andrews & Bro., New York, Centrifugal Pumps. Sluithour & Mintzer, Philadelphia, Force and Bilge Hand Pumps.

Sluithour & Mintzer, Philadelphia, Hand Fire Engines. Putnam Machine Co., Fitchburg, Mass., Steam Engine and Turbine Wheel. Josiah Gates & Sons, Lowell, Mass., Leather Hose and Leather Belting. Crane Bros., Chicago, Steam Pumps, Elevator Rope, Hose Nozzles. R. D. Wood & Co., Philadelphia, Fire Hydrants, Cast Iron Pipes, Valves. Norwalk Iron Works Co., South Norwalk, Conn., Non-expansive Steam Pumps, Steam Engines. La France Mfg. Co., Elmira, N. Y., Rotary Steam Fire Engine Pumps and Engines. W. D. Andrews, New York, Boiler and Elevator. Thomas Shaw, Philadelphia, Hydraulic Valves, Test Pumps and Gauges. B. Fitts, Worcester, Mass., Steam Whistle for use during the Exhibition. Lathrop Anti-Friction Co., New York, Composition for Bearings. Wickersham & Brothers, Philadelphia, Oil Cans and Feeders. William Ruoff, Philadelphia, Double and Single Geared Jack Screws. Leng & Ogden, New York, Siphon Pumps, Lever and Cam Gate Valves. M. C. Isaacs & Co., Chicago, Steel Wire Brushes. Elborne L. Rosevelt, New York, Hydraulic Automatic Organ Blower. U. S. Metallic Spring Packing Co., Boston, Steam Pressure Packing. Jerome Wheelock, Worcester, Mass., Automatic Cut-off Engine. Boston Hydraulic Mortar Co., Boston, Hydraulic Automatic Organ Blower. Jerome Wheelock, Worcester, Mass., Steam Engine Piston Packing. Crane Bros., Westfield, Mass., Japanese Paper Belting. James Haworth, Philadelphia, Hydrant Turbine. Pusey, Jones & Co., Wilmington, Del., Expanding Pulleys and Temper Cut-off for Steam Engines. Hertzler Herman, Philadelphia, Speed Indicator. Schutte & Goehring, Philadelphia, Pumps. A. & F. Brown, New York, Hangers and Pulleys. Neale & Levy, Philadelphia, Steam Engines. H. Vogt, Brooklyn, Boiler. Jackson Richards, Philadelphia, Piston Packing. Richard Dudgeon, New York, Rotary Engine. Williamson Bros., Philadelphia, Hoisting Engine with Spur and Frictional Gearing. R. J. Barr, Philadelphia, Steam Trap. Canfield Mfg. Co., Philadelphia, Packing. A. & F. Brown, New York, Engine and Pulleys. Charles Zoepke, New York, Gate Bars. E. H. Ashcroft, Boston, Steam and Vacuum Gauges, Safety Valves. Baxter Steam Engine Co., New York, Steam Engines. George B. Brayton, Philadelphia, Hydro-Carbon Engine. J. C. Hoadley Co., Lawrence, Mass., Portable Steam Engines. J. H. Mitchell, Philadelphia, Vertical Steam Engines. George W. Harrold, Rochester, N. Y., Automatic Steam Trap. Roland Rhett, Baltimore, Spring Motor for Sewing Machines. Josiah A. Osgood, Boston, Metallic Spring Packing. Levi F. Smith, Philadelphia, Boiler Try Cocks. Henry S. Lansell & John S. Long, New York, Lever and Cam Valves for Water, Steam, etc. L. Katzenstein & Co., New York, Metallic Packing for Piston Rods and Valves' Stems. Ames Iron Works, Oswego, N. Y., Portable Steam Engine. John E. Lindlaw, New York, Fire Escape. Love, Grove & Co., Philadelphia, Vertical Tubular Boilers. Thos. Mills & Bro., Philadelphia, Vertical Engine and Ice Cream Freezer Combined. Craig & Brevoort, New York, Condenser for Steam Pumps. James L. Jackson, New York, Improvements in Making Patterns and Castings. F. D. Chase, Boston, Ventilating Deck Iron. Philadelphia Hydraulic Works, Philadelphia, Steam Pump. Mathias Pennypacker, Philadelphia, Hand Hoisting Machine. Aultman, Miller & Co., Akron, Ohio, Self-registering Dynamometer. Stanley G. Flagg & Co., Philadelphia, Fittings for Gas, Steam and Water Pipes. Fred. Lunkenheimer, Cincinnati, Lubricators, Oil Cups, Steam Valves, etc. Wm. Powell & Co., Cincinnati, Valves and Lubricators. E. A. Street, New York, Portable Fire Pump. C. R. Patterson, Pittston, Pa., Suction and Blast Fan. Alfred Gomersall, Philadelphia, Engines and Pumps. Merrill & Keitzer, Baltimore, Gauge Cocks.

Group XXI.
Cornell University Machine Shop, Ithaca, N. Y., Foot Lathe, Gauges and other Tools.

Group XXIII.
William Earl, Nashua, N. H., Machine for Shearing Sheep. Thomas Patent Smoothing Harrow Co., Geneva, N. Y., Harrow and other Tools. Blymer Mfg. Co., Cincinnati, Fixed Horizontal Engine for Sugar Machinery. Fairbanks & Ewing, Philadelphia, Cheese Factory and other Scales. R. H. Allen & Co., New York, Phillips Spiral Corn Husker. Wheeler & Millicock Co., Albany, N. Y., Straw Preserving Reel Thresher. Randolph Bros., N. Y., Ditching and Draining Machines. W. L. Boyer & Bro., Philadelphia, Combined Metal Mill and Bolting Screen. Osborne Mfg. Co., New York, Bird Cages. Hendricks & Co., Bird Cages. Murphy & Broom, Philadelphia, Wire Cages and Wire Work, etc. White Mountain Freezing Co., Laconia, N. H., Freezing Machine for Ice Cream. Iron Milk Can Co., New York, Milk Cans. T. Hyde Fisher, Chicago, Refrigerators. E. B. Smith, Albany, N. Y., Dry Air Refrigerator. C. G. Blatchley, Philadelphia, Ice Cream Freezer. R. H. Allen & Co., New York, One Row Corn Drill. Clement & Dunbar, Philadelphia, Cellar Ware, Churns and Ice Cream Freezers. R. H. Allen & Co., New York, Victor Brick Making Machine. Chadborn & Coldwell, Mfg. Co., Newburgh, N. Y., Lawn Mowers. Jewell & Stevens, New York, Jewell's Self-Opening Cans.

Group XXV.
Frederick Meyer, Newark, N. J., Weighing Scales. Price, Liseth & Co., Philadelphia, Weighing Scales. Buffalo Scale Co., Buffalo, N. Y., Weighing Scales. John C. Dell, Philadelphia, Scales and Weights. Becker & Sons, New York, Balances of Precision. Henry Troemmer, Philadelphia, Scales and Balances. Richle Bros., Philadelphia, Weighing and Testing Machines.

Brandon Mfg. Co., Brandon, Vt., Weighing Scales. E. & T. Fairbanks & Co., St. Johnsbury, Vt., Scales and Weighing Beams. Union Water Meter Co., Worcester, Mass., Water Meters. Fales, Jenks & Sons, Pawtucket, R. I., Water Meters. Samuel Archbold, Philadelphia, the Marsland Water Meter. W. E. Desper & Co., Worcester, Mass., Water Meter. J. W. Maclay, New York, Nicolas & Chamon's Water Meter. National Meter Co., New York, the Gem Water Meter. Osterheld & Eickemeyer, Yonkers, N. Y., Dynamometer. Thomas Shaw, Philadelphia, Pressure Gauge. Prof. Robert H. Thurston, Hoboken, N. J., Machine for Testing Strength of Materials. Gustav Black, New York, Parallel Ruling Machine. Stanley Rule and Level Co., New Britain, Conn., Rules, Levels and other Tools. Eagle Square Mfg. Co., S. Shaftesbury, Vt., Steel Squares and Rules. E. R. McKean, Washington, D. C., Gauging Instruments.

Group XXVI.

Penn. Geological Survey Commission, Geological Map in Relief (Pennsylvania). Penn. Geological Survey Commission, Geological Charts, Relieves and Profiles (Pennsylvania). Richard P. Morgan, Bloomington, Ill., Elevated Steam Railway. Detroit Bridge and Iron Works, Detroit, Mich., Bridge over Missouri River at St. Joseph, Mo. F. C. Lowthrop, Lowthrop & Henderson, Trenton, N. J., Plans of Iron Bridges and Turn Tables. Gen. Wm. Socy Smith, Maywood, Cook county, Ill., Drawings of Pneumatic Calson. Garry Iron Roofing Co., Cleveland, Iron Roofing. Keystone Bridge Co., Philadelphia, Illinois and St. Louis, Steel Arched Bridge. U. S. Hoisting and Conveying Machine Co., New York, Hoisting and Conveying Machines or Apparatus. The Gunpowder Pile Driver Co., Philadelphia, Gunpowder Pile Driving Machine. Keystone Bridge Company, Philadelphia, Improvements in Pivot or Swing Bridge, Riveted Columns.

Group XXVIII.

Lobdell Car Wheel Co., Wilmington, Del., Cars and Locomotives.

Group XXIX.

John L. Mason, Camden, N. J., Mason's Patent Glass Fruit Jar of 1872. Ella Haller, New York, Fruit Jars.

Centennial Notes.

VULCANIZED FIBER COMPANY.

Wilmington, Del. This company make a very interesting display of their vulcanized fiber in Machinery Hall, Section D 9, Col. 63. Vulcanized fiber is an entirely new article of manufacture, consisting of vegetable fiber reduced to a pulp, and then subjected to powerful chemical treatment, whereby the original properties of the fiber are entirely changed, and a new and valuable material is produced, which is already largely utilized, and enters into many branches of mechanical industry. The process and the different articles made are secured by numerous patents, but the goods are sold at less prices than competing articles, while they are said to be of a superior quality to anything of a similar nature ever offered. They are made either hard or flexible, varying in their properties to some extent, according to the uses for which they are intended. The hard fiber is somewhat like horn in its consistency, is very tough and strong, has remarkable durability under friction, and remains permanently elastic under all ordinary conditions of weather or temperature. The flexible fiber closely resembles English sole leather in appearance, and is largely used as a substitute therefor in mechanical appliances, but is much closer grained and far more durable, and being of uniform quality and thickness throughout cuts without waste. It is used largely in place of rubber for packing. It is extensively used in the manufacture of washers for axes, compression cock washers for plumbers' use, car box washers, fish-bolt washers, journal bearings, bushings, &c., and for the following reasons is said to be superior to leather or rubber: "It is perfectly insoluble in hot or cold water, oil, naphtha, petroleum or alcohol, and is but slightly affected by most of the acids, and is remarkably adapted for plumbers' washers, for the following reasons: 1st. It will not absorb oil or any other fluid, except water; and the only effect that either hot or cold water has upon it, is to cause it to expand and become elastic like leather. 2d. It will not stick to anything, and, therefore, never becomes fast in a faucet like rubber. 3d. These washers outwear three or four leather or rubber ones, and always make a tight joint. 4th. They are cheaper than any others, and being made to order of any size, always fit well and are readily applied. They are especially useful as flexible car box washers, for dust guards, oil box covers, &c. Heretofore leather has been used for this purpose, but soon becomes rotten and limp with the oil, rendering them useless, while it is claimed that the vulcanized fiber washers are not effected by oil, grease or petroleum; do not cut the axes, as grit does not adhere to them, and will outwear several leather ones. They are now in use on many leading railroads, and are said to give perfect satisfaction. It has long been a desideratum with railroad officials to provide a permanently elastic compensating cushion at the joints of the rails to absorb the tremendous shocks and vibrations to which the tracks are subjected, and thereby reduce the destructive wear of both rails and rolling stock, and render the roadway comparatively smooth and noiseless. Various devices of rubber, wood, steel, etc., have been tested with only moderate success even when new; but all lacked the essential element of durability, until the introduction of vulcanized fiber, which is not injured by exposure to the weather, or affected by extreme heat or cold, and these simple and inexpensive washers are said to accomplish the desired result. These sheets are made 42 in. wide by 5 ft. 6 in. long, and of any desired thickness from 1/32 to 1/16 in., but are usually cut into half sheets 21 in. wide by 5 ft. 6 in. long for convenience of shipment. These goods are used for carriage washers, gaskets, water packing, plumbers' fittings, car box washers (or "dust guards"), oil box covers, and a great variety of uses. While not in all cases a substitute for leather or rubber in mechanical uses, they are in many positions far superior to either of these articles, and as experience determines the places to which they are especially adapted, they supersede all competing goods for such uses. An immense trade is already done with axle makers, carriage factories and livery stables for carriage axle washers; with railroads and car manufacturers for car box washers and oil box covers; with plumbers and faucet makers for water packings of various kinds; and also with water companies, pump makers, etc., for fire hydrants, pumps, etc.

The Iron Age.

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The Centennial Medals.

Thus far, the work of the judges appointed by the Centennial Commission to make awards of premiums to exhibitors has been regarded with general dissatisfaction. The impression prevails that the medals have been given without proper discrimination. Those who do not receive them are, naturally, disappointed and dissatisfied. Those who did, feel, as the rule, that the honor was conferred so liberally that it has but little value. We fear this objection is well taken. To the general public it would seem as if the principal care of the judges had been to avoid invidious distinctions between exhibitors, and to disappoint no one's expectations or wishes. We find on looking over the official list before us, that, in one group, as many as seven medals have been awarded for walnuts, six for silberts and several (we have not time to count them) for chestnuts. It would seem to the average mind that if any premiums were to be awarded for such things at all, one would suffice. Giving medals by the handful in this way does, we admit, seem like making honors rather cheap, and when the general list swells up high among the thousands, the impression is strengthened.

Of course, we understand that the medal is only a token that an award has been made, and that the real award of value is

the written report of the judges. This, however, does not make the matter much better. The medal is what the exhibitor has to show the general public, which will not take the time or the trouble to read a document, however brief. The receipt of such a medal at an international exhibition has hitherto been supposed to indicate that the exhibitor receiving it had shown something of superior excellence, value or beauty. The accompanying report was merely an explanation. In this case the medal itself means nothing more than that a report has been made, and unless the contents, or "motive" of such report is known, the medal is practically without significance. To say that one received a bronze medal at Philadelphia will be to cause a smile, and to suggest the idea that he must have made a poor showing indeed if he had not.

The plan of presenting medals of small intrinsic worth, accompanied by a report, is, we think, a good one. We also like the idea of making the medals uniform, so that the real value of the award shall be found in the accompanying report. We think, however, that while reports, diplomas, &c., might have been given to all exhibitors of articles worthy of official notice, only those should have received medals whose exhibits possessed peculiar excellence. The intrinsic value of the medals is a matter of no consequence. They might as well be of bronze as of gold or silver, but the idea of giving the same medal to the Corliss engine and a hat full of chestnuts, to Herr Krupp and the ingenious lady who made the whistle out of the skin of a pig's tail, is, to say the least, ludicrous. Men who have spent thousands of dollars, and made such displays as the world has never seen before, do not like to receive the same medal as is awarded to the venerable old ladies who have sent bed quilts of variegated patchwork. The thing is incongruous, and nothing which the judges may have to say in their reports will make it much better.

If medals were to be given by the wagon load, would it not have been better to have presented one to each exhibitor? It would then have been understood that they conveyed no honor, and were merely distributed as mementos of the Centennial to those who had contributed to its interest and success by becoming exhibitors. The reports would then have been the real awards, and in these the good qualities of the successful exhibits would have been recorded. There would then have been nothing to complain of. As it is, however, the medal business is likely to bring the whole work of the judges into contempt. Every one familiar with the exhibits in any class or department, who will look over the list of awards, will see that some, perhaps many, medals have been bestowed upon undeserving exhibits. The list is full of surprises and disappointments. There has evidently been discrimination, but how or on what plan we cannot imagine. Under the circumstances, we think the public verdict will be that, while it is no great credit to have received a medal, it is no discredit not to have received one. What happened at Vienna, where honors were so easily won that many exhibitors declined them, should have taught our commissioners the folly of trying to please everybody.

The Outlook for Pig Iron.

The blast furnace table, published in our issue of September 28th, makes a showing of the anthracite furnaces in eastern and middle Pennsylvania that is anything but satisfactory. Of the 161 furnaces in the sections named, but 54, or between 33 and 34 per cent., were in blast on the 1st of September. This is 2 or 3 per cent. more than the average for the country, but the anthracite furnaces of Pennsylvania, with the proximity to the fuel used, should make a much better showing than this, and the indications are that by the time of our next report a larger per cent. will be in blast. The reports we are daily receiving from the eastern part of Pennsylvania leave no doubt that in that section, at least, there is a decided belief that the reaction has come. As will be seen by our "Business Items," ore banks that have been idle are being reopened, and those that have not suspended are showing signs of increased activity. Collieries are resuming work full force and full time, and blast furnaces are being put into blast. The action of the Thomas Iron Company in this particular is significant. This company has generally the reputation of running its furnaces in accordance with the state of the trade, blowing when the demand seemed to warrant, and blowing out when it would not. For months they have been running light, but now they have six out of their eight anthracite furnaces in blast, and it is reported that the other two will soon be running. This seems to indicate two things: one, that pig iron can be made

at the present figures at a profit; and the other, that the stocks in hand in the Eastern part of the country, and the prospective consumption, are such as to justify something of an increase in production. It must be remembered, however, as we show below, that the Thomas Iron Company have exceptional facilities for manufacturing iron cheaply. It will also be noticed that Mr. G. Dawson Coleman has blown in one of his furnaces, that the ore mines of E. & G. Brooke and of Seyfert McManus & Co. are being reopened, which would indicate that the Bushong furnaces will not long be the only ones in blast in Reading. Eckert & Brother are contemplating blowing, the Crane Iron Company blew in another furnace on the 28th of last month, and at many points fires have been started in the furnaces and preparations for blasts have been made.

The reduction in the price of ore has had a stimulating effect on the iron industry. Just what the reduction has been it is difficult to say. Some of the furnaces bought coal at the first sales after the combination broke, and got it lower than they could buy it now, while the present price to furnaces seems to be in doubt, and perhaps it really varies, owing to the keen competition and the irritation consequent on the breaking of the combination. We give below extracts from two letters bearing on this point. They are both from persons whose names would carry the greatest weight did we publish them.

The following is from a Lehigh Valley furnace: "We have only had a reduction of 25 cents per ton in price of coal and 15 per cent. in freights. Our average consumption of anthracite coal from January 1st to July 1st was 1 ton 12 cwt. per ton of iron. Before the break in price coal cost at our works \$3.28, now \$2.94."

From the Schuylkill Valley: "Prior to the break in the coal combination the price of lump and steamboat coal was \$2.85 at Schuylkill Haven, the shipping point. To furnaces and rolling mills it was 25 cents per ton less, or \$2.60. From the shipping point to Reading the freight was 80 cents per ton, making the coal there \$3.40. Now the coal is \$2 and freight 80 cents—\$2.80 at Reading. I understand some parties are buying at \$1.75 at Schuylkill Haven."

An analysis of these figures will show considerable of a variation in the price of fuel per ton of pig, as well as in the percentage of reduction in cost of iron caused by the reduction in price of coal. Take the figures from the Lehigh Valley. The coal per ton of iron is 1-6 tons, which would cost, at the old price, \$5.24 per ton of pig, and at the new \$4.71, a reduction of 10 per cent. In the Schuylkill Valley, assuming the amount of fuel to be the same, viz., 1-6 tons to a ton of pig, at the old price the fuel would be \$5.44 per ton of iron, and at the new price \$4.48, a reduction of 17½ per cent. But if we take the price of coal at Schuylkill Haven at \$1.75, the cost of fuel per ton of pig would be \$4.08, or a reduction of 25 per cent. On the subject of this reduction the *Bulletin of the American Iron and Steel Association* has, in its issue of Sept. 20th, the following: "We have taken pains to inquire carefully into the reduction in the cost of pig iron caused by the break in the coal combination, and learn that in the Lehigh district it will not average 50 cents to the ton, and in the Schuylkill district it will not average \$1 a ton."

This would give very nearly the figures we have, ours being 53 cents in the Lehigh Valley, and, in one case, in the Schuylkill Valley 96 cents, and in the other \$1.21. Considering the difficulty in arriving at the exact prices paid and the amount of coal consumed, as well as the further fact that there will probably be a sharp competition for the furnace trade, we do not think the latter figure will be too great an estimate of the saving in the Schuylkill Valley, and we would be inclined to increase the amount over 53 cents in the Lehigh Valley.

In regard to the present cost of making pig we have the figures of the Thomas Iron Co., for December, 1875. The works are well known as the largest and among the best conducted in America. The company mines its own ores; works low grade ores (average of five years, 41 6 per cent.); has short transportation for fuel and ores (average 30 to 35 miles); smelts with anthracite coal; uses large furnace, "with all modern improvements," a very hot blast (900° Fah.) and high pressure; has produced on a long average, 33 per cent. of No. 1 X, 28 per cent. No. 2 X, 31 per cent. No. 3, and 8 per cent. No. 8. The cost of the ore includes not only the mining expenses, but also a royalty of 25 cents per ton for brown hematite, and 50 cents a ton for magnetite. The item of labor includes also repairs and the cost of blowing in and out. In December, 1875, the total cost per ton was \$30.32, made up as follows: Coal,

\$5.99; ore, \$10.12; limestone, 64 cents; labor, \$3.56. Assuming the cost of fuel at present at this furnace to be that given above in the letter from the Lehigh, viz., \$4.71, and the reduction in the cost of ore and labor as 10 per cent. we would have a total reduction in the cost of \$2.54, making the total cost per ton \$17.78. These reductions certainly do not appear excessive. The item of labor is even at the reduction nearly double what it is costing the best furnaces in the West, and the ore would still average—41 per cent. being taken as the yield—\$3.73 per ton.

If the above is approximately correct, it shows that at one furnace at least in the Lehigh Valley iron can be made at a small profit. It is possible that this is not generally true; indeed, we think it probable that it is not. While there are many anthracite furnaces in Pennsylvania that can either make at a profit or not at a loss, there are many that cannot run and clear themselves. In this struggle for existence these must succumb. As we have already suggested, the "survival of the fittest" holds in the evolution of the furnace industry, and the "fittest" is not the one away from ore, coal and a market—that is, it is the well located furnace. The poorly located ones might make money if iron would reach the figures of several years ago. There was no struggle for existence then, but from such a condition of the market the intelligent iron-master will ask to be delivered in litanies that shall be full both of spirit and understanding:

Bessemer Steel.

The condition of the Bessemer industry is such that we may be pardoned for again referring to it. While it is a fact that some large orders have been placed both East and West, it is also true that steel rails have at last reached a price at which it appears almost impossible to produce them, and the result must be either that some understanding must be reached between the manufacturers as to price, or some mills will be compelled to stop until the demand is so much better as to afford better prices. Of course, there are other alternatives, such as cheapening the cost or waiting until the mills that are ready to take orders at low prices are filled up; but relief from these measures is slow in coming, and we speak now of immediate relief. At the Edgar Thomson Works just at this time there is, fortunately, a necessity for repairs, and they will shut down next week for several weeks. We learn also that the Bessemer manufacturers have a meeting in New York this week to endeavor to reach some understanding, but we are not at present advised of the result.

How great the decline has been will be more readily seen when it is remembered that in March, 1883, steel rails sold at \$74 per ton, at works, and that within a few days they have been sold in the East at \$50, delivered at Amboy, or about \$48 at the mill. In the West they have sold at \$48, at the works, one-half cash and one-half six months. Each order was for 5000 tons for the Pacific Road. A year ago they were selling at \$66 to \$68, and iron rails were selling at \$46.

The cause of this decline appears to be mainly an over supply, but this need not necessarily have sent them so low. The Bessemer works are so few that it need not be a very serious matter to so regulate production as to prevent rails from going to ruinous prices. We believe an attempt was made in this direction about a year ago, but it was unsuccessful. If an intelligent and earnest effort is now made, there is no reason why it may not succeed.

English Protection Against American Manufactures.

The following significant dispatch was cabled from London under date of October 7th:

The *Sheffield Telegraph* to-day publishes the following: "In consequence of the injury to Sheffield trade by America's heavy protective duties, representations have been made to Earl Carnarvon, Secretary for the Colonies, suggesting that heavy import duties be imposed in retaliation on American produce, both in England and her colonies. To these representations Lord Carnarvon replied on Friday that, 'as will be seen on reflection, the proposal is not one which her majesty's government could entertain.'"

This does not mean exactly what it may seem to mean on first reading. The idea of "retaliation" does not enter into the reasons why the English manufacturers desire protection. It is simply a movement inspired by the instinct of self-preservation. They are feeling the effects of American competition at home and abroad to an extent which fills them with serious forebodings of the future. They may not be ruined by it, but they are already crippled by it. In looking over a recent issue of one of the leading British engineering journals, we find the displayed cards of 17 prominent firms advertising American

machinery and tools, and such specialties as American saws, axes, tailors' shears, &c., are largely sold by resident agents in the principal cities of Great Britain. This is annoying, but it is not probable that Sheffield manufacturers have any fear of being driven out of their own home markets by American products. Not so, however, in the British colonies. These are the real battle ground of competition. During the past few years American goods have steadily gained in favor in the British colonial markets, and are rapidly and surely displacing English hardware. The loss of the American market which followed the imposition of the tariff in 1861 was a severe blow to the prosperity of the leading Sheffield industries; but the colonial markets remained, and to the development of these every energy was directed. When protection had borne its legitimate fruit in this country, in extending and diversifying our industries and developing our skill and resources, and we began to make goods at prices which, considering their excellent quality and finish, admitted of their exportation to foreign markets, the attention of our manufacturers was directed to the British colonies as inviting fields for the display of enterprise. The early ventures in these directions were attended with encouraging results, and before the Sheffield manufacturers were aware of what was going on, our axes, hatchets, saws, hammers, cutting tools of all kinds, and many other of our manufactures of iron and steel had gained a foothold in the colonial markets from which no pressure of competition could dislodge them. The effects of this enterprise were first felt in the falling off in orders from Canada and the maritime provinces of the Dominion. This was followed by a falling off in orders from Australia and New Zealand. In these markets the best trade calls for American goods, which are preferred because they are lighter, of better shape and finish and more "handy." In an article on the subject of American competition with English edge tools, published a few months ago, the *Birmingham Post* says:

English edge tool makers in particular are fully aware of the success with which certain of their business rivals in America have hustled them in many of our home and foreign markets. So large, however, is the demand at present for good edge tools of almost every description, that there are few edge tool firms in the United Kingdom who have not got plenty of orders upon their books. The English article is not, therefore, out of use, but there is a perceptible increase in the favor in which handy and thoroughly excellent tools are held, both at home and abroad; and this is being encouraged by the growing facilities for manufacturing by the growing facilities for manufacturing, both at home and abroad. In this, certain American firms are pushing their opportunity. Hence it comes about that American forks and shovels and axes are to be had wherever edge tools are offered in this country. But it would seem that the Americans believe that they can compete with us much more successfully by having branch establishments to manufacture their specialties in this country, rather than by shipping their products from the other side. If American edge tool makers should begin to produce here goods that are already running English makers hard, then it is to be inferred that their example will be followed by other transatlantic hardware manufacturers. If, in such an event, the English firms will keep as well employed as they now are, is another matter.

Of our competition with English hardware in the colonies, the *Ironmonger* lately said:

We have, from time to time, drawn attention to the success with which hardware manufacturers in the United States have competed with some of the British firms in certain foreign markets hitherto supplied almost exclusively from this side, at the same time that United States products have been finding their way into their own country. The reports to hand from the different hardware districts still confirm that there is little or no revival in the demand for iron and hardware products required in Canada. Thither it is well known the United States manufacturers continue to send the goods they make at rates much under those wanted by the English manufacturers. But this is not all. Some of the manufactured goods sent across the Lakes into the Dominion are said to be more handy than the English patterns. Some time ago we reported that the United States iron and hardware manufacturers were pushing their advantage in Australia and New Zealand. In those markets, likewise, American enterprise is still disagreeably apparent. The worst of it is that not a few of the American goods are declared, as to quality, to surpass our own. As to the Antipodean markets, all that we have here said is borne out by a communication which has been received by a firm of Birmingham merchants from their agent in Melbourne. He writes as follows: "You will notice our indent runs more on American ironmongery than formerly. Their goods are far superior to English made, and lately they have been much cheaper. There is no comparison in the profits they pay us, and they give universal satisfaction. Small wares, locks, tools, &c., indeed, all sorts of American made goods, are now being sold in the market; and when once used, seem, or sold, the user or buyer will never again look at English made articles of the same class."

These two quotations, which guardedly and reluctantly admit facts which were carefully concealed until they became matters of common talk in trade circles, show what is the motive which actuates the Sheffield manufacturers in seeking to secure the imposition of a tariff on American goods brought into Great Britain and her territories. They want "protection." It would be humiliating to confess it, after all they have said about the folly and wickedness of our tariff policy, so they put it on the ground of retaliation. "The American government has done us vast injury," say they, "by protecting Ameri-

"can manufacturers until they have met the wants of their own market and are reaching after ours. Let us retaliate by a tariff for our own protection."

The manufacturers of Sheffield are not the only ones in Great Britain who are beginning to feel that a little protection just now would be a good thing for British industry. The paper makers, the sugar refiners, the cotton manufacturers and many others are clamoring for protection, and appeals to the Home Office for some form of protection against foreign competition are matters of almost daily occurrence. It is not probable that the British government will take any action in the matter until forced to it by pressure of public opinion. The "traditional policy" of free trade will not be abandoned so long as the classes which now govern the country continue in power. It is quite certain that the people of this country will never trouble themselves in the matter, and that we shall not seek to influence either legislation or public opinion on the subject. They will best promote our interests by adhering to the free trade idea, and we shall neither send money, tracts nor missionaries to convert them to our own way of thinking. We would suggest, however, that if any of our discomfited and unhappy Sheffield competitors should decide to follow the examples of the Sandersons, and come here to regain the trade they have lost, they will receive a hospitable welcome and find better opportunities for the investment of capital than are now offered in the manufacturing districts of England.

The proposal of the Reading Railroad Company to attempt the exportation of anthracite coal to South America and other countries now largely supplied by England, is regarded with much favor by the people of Pennsylvania. It will probably have the effect of considerably increasing the commercial importance of Philadelphia, and will also relieve the market and enable the great mining and carrying companies to employ more fully their facilities, and to earn larger aggregate profits. We do not believe, however, that such a trade would be permanent, nor that it would be of benefit to the country. Anthracite coal can only be considered in the light of a national luxury, since the regions in which it is found are comparatively limited, and the supply will doubtless be exhausted long before our other coal fields are fully developed. The deposits of anthracite are very insignificant when compared with the area of the soft coal fields, and the time must come when its use will be confined to the household. While it is not probable that anything like an anthracite famine will be experienced by this generation, the time when the field will be exhausted is not a matter difficult of computation. The home consumption is increasing in an exceedingly rapid ratio, and in the future will be still more rapid. As a fuel for the household it has no equal; for manufacturing and steam purposes it is by no means equal to many other kinds. Under these circumstances, the interest of the nation is to keep this valuable fuel for home consumption. A foreign demand will one of these days have to be supplied at the expense of reducing home consumption. In this matter it will not answer to look only at present time and our immediate wants, because in this thing a small beginning is likely to become before many generations are past a very serious national evil. We cannot, however, expect that a corporation with a diluted capital, an enormous debt and a large annual interest and dividend account to settle, will look at this question from any but a selfish standpoint. If they can make a present profit, the future may take care of itself.

The Additional Awards.

We give below a selection from the official list of "Additional Awards" of the names of exhibitors showing articles of interest to our readers. The "Motives" have not yet reached us. We hope to have them in time for our next issue:

Group I.

George W. Gordon, Boston, Glass Sand. Hampton, Cutter & Sons, Woodbridge, N. J., Clays. J. Kolnigsberg, Huntington, Pa., Coke Oven. Mahoning Valley Cen. Association, Youngstown, Coals, Iron Ores and Pig Iron. Hongkong Rock Iron Region, Portsmouth and Ironport, Pig Iron. Virginia District, Iron Ores. Huntington and Broad Top Coal and Iron Region, Coals, Coke, Iron Ores, etc. State of Tennessee, Iron Ores. State of Indiana, Coals, Iron Ores, Iron, Malleable Castings. New York Section, Iron Ores. State of Maryland, Mineralogical and Geological Collection. Illinois Industrial University of Natural History, Lead Ores. State of Missouri, Collection of Ores. Lake Superior District, Iron Ores. Territory of Arizona, Silver, Lead and Gold Ores. State of Pennsylvania, Bituminous Coals. State of Pennsylvania, Semi-Bituminous Coals. State of Pennsylvania, Anthracite Coals. State of Ohio, Coals. State of Kentucky, Coals. Providence Franklin Society, Providence,

Minerals and Geological Specimens from Rhode Island. State of Iowa, Geological Collection. Virginia Mining Bureau, Virginia, Collection of Ores. Geological Survey of New Jersey, Geological Collection. State of Wisconsin, Collection of Minerals, Rocks, etc. State of Arkansas, Mineralogical Collection. Geological Survey of Kentucky, Geological Collection. Geological Survey of Pennsylvania, Geological Collection, etc. State of Nevada, Collection of Ores and Stamp Mill. Territory of Montana, Silver, Lead and Gold Ores. State of Michigan, Collection of Ores. State of Colorado, Lead, Silver and Gold Ores. State of Delaware, Mineralogical Collection. State of Missouri, Iron Ore. Lehigh Valley Region, Pig Iron. State of Kansas, Geological Collection. Smithsonian Institute, Ores and Minerals. Marietta, Pittsburgh and Cleveland Railroad, Coals and Iron Ores. Selma, Rome and Dalton Railroad, Coals and Iron Ores. South and North Railroad of Alabama, Iron Ores and Geological Sections. St. Louis, Iron Mountain and Southern Railroad, St. Louis, Collection of Ores. Chattanooga Map Co., Chattanooga, Map of Mineral Region around Chattanooga. State of Iowa, Coals. State of Kentucky, Coal and Iron. Smithsonian Institute, Collection of Ores. State of West Virginia, Geological Collection.

Group II.

Dixon Crucible Co., Jersey City, Graphitic Crucibles. J. H. Garretson, Richland, Iowa, An Impact Brick Machine. Michael Ehrst, Jr., Philadelphia, Granulated Slag Roofing.

Group III.

Waggoner, Gifford & Co., Chicago, Mixed Paints. Page, Kidder & Fletcher, New York, Coal Tar Products. Edward Coe, New Haven, Conn., Automatic Electric Gas Valve. Andrew O'Neill, Ansonia, Conn., Gas and Water Main Connector. Thomas Rowland, Brooklyn, N. Y., Steam Stoker. Excelsior Gas Machine Co., South Norwalk, Conn., Maxim Gas Machine. Morris, Tasker & Co., Philadelphia, Gas Works Machinery. A. W. Rand, Philadelphia, "The Victor Gas Machine." Gilbert & Barker, Springfield, Mass., "Springfield Gas Machine." Y. D. Townsley, Cincinnati, Gas Machine. Improved Steiner Gas Machine Co., Philadelphia, Portable Gas Machine. Novelty Gas Machine Co., Baltimore, Carbureting Gas Machine. F. S. Pease, Buffalo, N. Y., Lubricating and Improved Machinery Oils. Joseph H. Adam & Son, Peekskill Mfg. Co., New York, Sugar Mills.

Group VII.

Z. Cobb & Sons, Wilmington, Del., Furniture and Door Springs. J. C. Anderson, Pittsburgh, Sash Balance. American Machine Co., Philadelphia, Wringing Machine, Fluting Machine.

Group IX.

Dorman Bros. & Co., Philadelphia, Power Carpet Loom. R. Parkhurst & Co., Newark, N. J., Burring Machines.

Group XI.

Meriden Britannia Co., West Meriden, Conn., Silver-Plated Goods.

Group XIV.

Peter Carrigan, Philadelphia, Plumbing, Copper Work, Bath Tubs, Food Tins, Links, Copper Kitchen Utensils. Providence Gas Burner Co., Providence, R. I., Gas Burners, Drop Light Sockets, etc. Woods, Sherwood & Co., Lowell, Mass., Tinned Wire Ware. Cornelius & Sons, Philadelphia, Gas Fixtures. Wilhelm & Newman, Philadelphia, Post Lamps, Silvered Mica Reflectors. F. H. Lovell & Co., New York, Drummond Kerosene Burner, Centennial Chimney and Felt Wick. Bradley & Hubbard Mfg. Co., Gas and Oil Fixtures and Lamps. Archer & Pancoast Mfg. Co., New York, Gas Fixtures. C. F. A. Heitrichs, New York, German Student Lamps. C. L. Hayward and J. M. Bruce, Boston, Vesper Elevating Street Lamp Post. Christoph Relsner & Co., New York, "Summer Queen" Oil Cook Stove. Open Stove Ventilating Co., New York, "Fire on the Hearth" Parlor Stove. Richardson, Boynton & Co., New York, Boynton's Open Franklin "Tile" Portable Stove. Mrs. Charlotte H. Sterling, Gambier, Knox county, O., Dish Washing and Drying Machine, for washing and drying dishes without the wetting of the hands or the use of a brush or cloth of any kind. Lalauze & Grosjean, New York, Sheet Metal Culinary Utensils, Stamps or Pressed from Iron, Brass, Copper and Tin Plates, etc. J. Hall Robman & Son, Philadelphia, Coffee, Tea and Spice Caddies and Scales, Safe Deposit Boxes for Banks, Security Companies, etc. L. F. Dupaignet & Huot, New York, Imperial French Cooking Range, Imperial Maracaibo Coffee and Tea Urns, Copper Ware and Cooking Utensils, etc. Ansonia Brass and Copper Co., New York, Patent Spur, Brass Kettles. Charles F. Harris, Philadelphia, Adjustable Elbow for Stove or Heater. Corrugated Elbow Co., New York, Corrugated Sheet Metal Elbows, made from one piece, for stove and other pipes. Swett, Quimby & Perry, Troy, N. Y., Graphic Parlor Stove. Missouri Valley Novelty Works, St. Joseph, Mo., Combination Kitchen Safe. Fuller, Warren & Co., Troy, N. Y., Stoves, Furnaces, Ranges, etc. B. F. Sturtevant, Boston, Machine for drying lumber, brick, wool, cotton, cloth, hosiery, corn and other grains, leather, glue, tobacco, etc., and for heating and ventilating public buildings, manufactories, etc. John Grossius, Cincinnati, Patent School House Ventilating Stove. The Odorous Excratant Apparatus Co., Baltimore, Machine for the emptying of vaults, stinks, cesspools, etc., without offence. Charles Burham & Co., Philadelphia, Gas Cooking Stoves, Reflecting Parlor Gas Stoves, Gas Heating Stoves. Cooper, Jones & Cadbury, Philadelphia, Water Closets, Compression Faucets, Pumps, Fountain Jets, Water Gages, etc. J. B. Cook, Toledo, O., Water Tank for public water supply, Auxiliary Stand Pipe, for the

service, to obviate the use of portable engines. David W. Law, Gloucester, Mass., Ice Crusher. Thomas S. Dixon & Sons, Philadelphia, Grates, Gas Lugs. Bissell & Co., Pittsburgh, Isaac Dupps' Patent Railroad Car Heaters. J. Reynolds & Son, Philadelphia, Shaking and Clinker Cutting or Grinding Grate, for house warming furnace or apparatus. Bissell & Co., Pittsburgh, Pittsburgh Elevated Oven Cooking Range. Bissell & Co., Pittsburgh, Peerless Radiating Shaking Grate. Henry C. Meyer & Co., New York, The Fuller Patent Faucet. Johnson, Black & Co., Erie, Erie county, Pa., Radiant Home Base Burning Stoves, Radiant Home Furnace. Dr. David B. Sturgeon, Toledo, O., American Depurating Bath. Swett, Quimby & Perry, Troy, N. Y., Empire Heating Range. Hitchcock Lamp Company, Watertown, Jefferson county, N. Y., Mechanical Lamp. Geo. Wagner, Washington, D. C., Ventilator. J. W. Bartlett, New York, Improved Street Lamp. Globe Gas Light Co., Philadelphia, Self Gas Making Street Lamps. H. H. Doty, Norfolk, Va., Kerosene Burners. Edward Miller, Meriden, Conn., Lamps and Lamp Trimmings. Mitchell, Vance & Co., New York, Gas Fixtures and Ecclesiastical Ware. Walton Bros., New York, Noiseless Open Base Steam Radiator and Ship's Galley. Walton Bros., New York, Lanters. Mt. Washington Glass Works, New Bedford, Mass., Crystal Chandeliers, Opal Lights, Globes and Shades, etc. Smith Bros., New Bedford, Mass., Glass Shades and Globes. Magee Furnace Co., Boston, Stoves, Ranges and Furnaces. Tatham & Bros., New York, Tin-lined Iron Pipe, Tin-lined Lead Pipe, Block Tin Pipe. Wm. Page & Co., Boston, Railway and Steamship Lamps. S. A. Wight, Philadelphia, Ventilator and Dust Trap. Baker, Arnold & Co., Philadelphia, Gas Fixtures. J. C. Bates, Philadelphia, Ventilators. August Wilhelm, Philadelphia, Ceiling Reflector. Protective Ventilator Co., New York, Ventilators. Cleveland Non-Explosive Lamp Co., Cleveland, O., General Kerosene Goods, Metallic Safety Lamps and Nickel-plating. Barstow Store Company, Rhode Island, Crystal Fire Place Heater. Otto Zwietsch, Milwaukee, Wis., Crystal Faucet, Drought Apparatus. Dreer, Smith & Dreer, Philadelphia, Berford Gas Sighting Apparatus. American Reflector Co., Philadelphia, Metallic Reflector. Richardson, Boynton & Co., New York, Improved Gas-tight Furnace. Richardson, Boynton & Co., New York, Baltimore Fireplace Heater. C. A. Biessing, Philadelphia, Copper Bath Tubs. C. A. Biessing, Philadelphia, Combination Cook for Bath Tub. Jonathan Miller, Meriden, Conn., Coffee, Tea and Extract Press. Job Bartlett & Son, Philadelphia, Wrought Iron Warm Air Furnace. C. W. Packer, Philadelphia, Ice Cream Freezer. Reading Hardware Co., Reading, Apple Parer. Job Bartlett & Sons, Philadelphia, London Kitcheners and Charcoal Boilers. Dr. G. W. H. Calver, Columbus, N. J., Household Ironing Machine. A. G. Meyers, New York, Field's Flush Tank. Alex. M. Leslie, New York, Zero Refrigerators. F. J. Walker, M. D., Philadelphia, Water Filter.

Group XV.

Stafford Mfg. Co., New York, Stencils and Key Rings. W. J. Fainigan & Co., Philadelphia, Samson Padlocks. E. Mills & Co., Philadelphia, Brace Bits, Saw Pads, Screw Drivers. American File Co., Philadelphia, Machine-made Files and Hand-cut Rasps. F. H. Evans, New York, Expansion Bolts. Alex. Krumpholtz, Philadelphia, Files and Rasps.

Group XVI.

Lafin and Rand Powder Co., New York, Magnetic Electric Blasting Machine. Lafin and Rand Powder Co., New York, Frictional Electric Blasting Machines.

Group XVII.

Benext & Co., Philadelphia, Carriage Springs.

Group XIX.

The Delaware Iron Ship Builders, Chester, Pa., Model of Steamships. John Englis & Son, Brooklyn, N. Y., Models, and Calculations of Steamships. The Rider Life Raft Co., New York, Two Life Rafts. Thos. F. Royland, Green Point, L. I., Iron Ship. Fank G. Fowler, Bridgeport, Conn., Steam Steering Propeller.

Group XX.

A. Gawthrop & Son, Wilmington, Del., Glass Models of Hydraulic Rams. Union Brass Works, Powell & Co., Cincinnati, Lubricators, Valves, etc. McNab & Harlin Mfg. Co., New York, Valves, Cocks, Whistles, Water Gauges. E. A. L. Roberts, Titusville, Pa., Steam Engine. Knickerbocker Ice Co., Philadelphia, Ice Tools, Elevators and Ice Machinery. Gould Mfg. Co., Seneca Falls, N. Y., Hand Fire Engine. B. S. Nichols & Co., Burlington, Vt., Vertical Steam Fire Engine. New York Belting and Packing Co., New York, Rubber Belting, Packing, Hose, etc. Hubbard & Aller, Brooklyn, N. Y., Steam Pumps. Colwell Lead Co., New York, Lead Pipe, Block Tin and Tin-lined Lead Pipe. Henry Q. Hawley, Albany, N. Y., Water Motors. Crane Brothers, Chicago, Model of Hydraulic Elevator. Isaac Hyneman, Philadelphia, Water Excavator. W. D. Andrews & Bro., New York, Centrifugal Pumps. Sluithour & Mintzer, Philadelphia, Force and Bulge Hand Pumps.

Sluithour & Mintzer, Philadelphia, Hand Fire Engines. Putnam Machine Co., Fitchburg, Mass., Steam Engine and Turbine Wheel. Josiah Gates & Sons, Lowell, Mass., Leather Hose and Leather Belting. Crane Bros., Chicago, Steam Pumps, Elevator Rope, Hose Nozzles. R. D. Wood & Co., Philadelphia, Fire Hydrants, Cast Iron Pipes, Valves. Norwalk Iron Works Co., South Norwalk, Conn., Non-expansive Steam Pumps, Steam Engines. La France Mfg. Co., Elmira, N. Y., Rotary Steam Fire Engine Pumps and Engines. W. D. Andrews, New York, Boiler and Elevator. Thomas Shaw, Philadelphia, Hydraulic Valves, Test Pumps and Gauges. B. Fitts, Worcester, Mass., Steam Whistle for use during the Exhibition. Lathrop Anti-Friction Co., New York, Composition for Bearings. Wickersham & Brothers, Philadelphia, Oil Cups and Feeders. William Ruoff, Philadelphia, Double and Single Geared Jack Screws. Long & Ozden, New York, Siphon Pumps, Lever and Cam Gate Valves. M. C. Isaacs & Co., Chicago, Steel Wire Brushes. Hiborne L. Roosevelt, New York, Hydraulic Automatic Organ Blower. U. S. Metallic Spring Packing Co., Boston, Steam Pressure Packing. Jerome Wheelock, Worcester, Mass., Automatic Cut-off Engine. Boston Hydraulic Motor Co., Boston, Hydraulic Automatic Organ Blower. Jerome Wheelock, Worcester, Mass., Steam Engine Piston Packing. Crane Bros., Westfield, Mass., Japanese Paper Belting. James Haworth, Philadelphia, Hydrant Turbine. Pusey, Jones & Co., Wilmington, Del., Expanding Pulleys and Temper Cut-off for Steam Engines. Hertzler Herman, Philadelphia, Speed Indicator. Schutte & Goehring, Philadelphia, Pumps. A. & F. Brown, New York, Hangers and Pulleys. Needle & Levy, Philadelphia, Steam Engines. H. Vogt, Brooklyn, Boiler. Richard Richards, Philadelphia, Piston Packing. Richard Dodge, New York, Rotary Engine. Williams Bros., Philadelphia, Hoisting Engine with Spur and Frictional Gearing. R. J. Barr, Philadelphia, Steam Trap. Canfield Mfg. Co., Philadelphia, Packing. A. & F. Brown, New York, Engine and Pulleys. Charles Zoeppe, New York, Grate Bars. E. H. Ashcroft, Boston, Steam and Vacuum Gauges, Safety Valves. Baxter Steam Engine Co., New York, Steam Engines. George H. Brayton, Philadelphia, Hydro-Carbon Engine. J. C. Hoadley Co., Lawrence, Mass., Portable Steam Engines. J. H. Mitchell, Philadelphia, Vertical Steam Engines. George W. Harrold, Rochester, N. Y., Automatic Steam Trap. Roland Rhett, Baltimore, Spring Motor for Sewing Machines. Josiah A. Osgood, Boston, Metallic Spring Packing. Levi F. Smith, Philadelphia, Boiler Try Cocks. Henry S. Lansell & John S. Long, New York, Lever and Cam Valves for Water, Steam, etc. L. Katzenstein & Co., New York, Metallic Packing for Piston Rods and Valves' Stems. Ames Iron Works, Oswego, N. Y., Portable Steam Engine. John E. Lindlaw, New York, Fire Escape. Love, Grove & Co., Philadelphia, Vertical Tubular Boilers. Thos. Mills & Bro., Philadelphia, Vertical Engine and Ice Cream Freezer Combined. Craig & Brevoort, New York, Condensers for Steam Pumps. James L. Jackson, New York, Improvements in Making Patterns and Castings. F. D. Chase, Boston, Ventilating Deck Iron. Philadelphia Hydraulic Works, Philadelphia, Steam Pump. Mathias Penypacker, Philadelphia, Hand Hoisting Machine. Aultman, Miller & Co., Akron, Ohio, Self-registering Dynamometer. Stanley G. Flagg & Co., Philadelphia, Fittings for Gas, Steam and Water Pipes. Fred. Lunkenheimer, Cincinnati, Lubricators, Oil Cups, Steam Valves, etc. Wm. Powell & Co., Cincinnati, Valves and Lubricators. E. A. Street, New York, Portable Fire Pump. C. R. Patterson, Pittston, Pa., Suction and Blast Fan. Alfred Gomersall, Philadelphia, Engines and Pumps. Merrill & Keitzer, Baltimore, Gauge Cocks.

Group XXI.

Cornell University Machine Shop, Ithaca, N. Y., Foot Lathe, Gauges and other Tools.

Group XXIII.

William Earl, Nashua, N. H., Machine for Shearing Sheep. Thomas Patent Smoothing Harrow Co., Geneva, N. Y., Harrow. Blymer Mfg. Co., Cincinnati, Fixed Horizontal Engine for Sugar Machinery. Fairbanks & Ewing, Philadelphia, Cheese Factory and other Scales. R. H. Allen & Co., New York, Phillips Spiral Corn Huskers. Wheeler & Millick Co., Albany, N. Y., Straw Preserving Rye Thresher. Randolph Bros., N. Y., Ditching and Draining Machine. W. L. Boyer & Bro., Philadelphia, Combined Metal Mill and Bolting Screen. Osborne Mfg. Co., New York, Bird Cages. Hendricks & Co., Bird Cages. Murphy & Broom, Philadelphia, Wire Cages and Wire Work, etc. White Mountain Freezing Co., Laconia, N. H., Freezing Machine for Ice Cream. Iron Milk Can Co., New York, Milk Cans. T. Hyde Fisher, Chicago, Refrigerators. E. B. Smith, Albany, N. Y., Dry Air Refrigerator. C. G. Blatchley, Philadelphia, Ice Cream Freezer. R. H. Allen & Co., New York, One Row Corn Drill. Clement & Dunbar, Philadelphia, Cedar Ware, Churns and Ice Cream Freezers. R. H. Allen & Co., New York, Victor Brick Making Machine. Chaborn & Coldwell, Mfg. Co., Newburgh, N. Y., Lawn Mowers. Jewell & Stevens, New York, Jewell's Self-Opening Cans.

Group XXV.

Frederick Meyer, Newark, N. J., Weighing Scales. Price, Liseth & Co., Philadelphia, Weighing Scales. Buffalo Scale Co., Buffalo, N. Y., Weighing Scales. John C. Dell, Philadelphia, Scales and Weights. Becker & Sons, New York, Balances of Precision. Henry Troemmer, Philadelphia, Scales and Balances. Richle Bros., Philadelphia, Weighing and Testing Machines.

Brandon Mfg. Co., Brandon, Vt., Weighing Scales. E. & T. Fairbanks & Co., St. Johnsbury, Vt., Scales and Weighing Beams. Union Water Meter Co., Worcester, Mass., Water Meters. Fales, Jenks & Sons, Pawtucket, R. I., Water Meters. Samuel Archbold, Philadelphia, the Marsland Water Meter. W. E. Deaper & Co., Worcester, Mass., Water Meter. J. W. Maclay, New York, Nicolas & Chamon's Water Meter. National Meter Co., New York, the Gem Water Meter. Osterheld & Elckemeyer, Yonkers, N. Y., Dynamometer. Thomas Shaw, Philadelphia, Pressure Gauge. Prof. Robert H. Thurston, Hoboken, N. J., Machine for Testing Strength of Materials. Gustav Blanck, New York, Parallel Riving Machine. Stanley Rule and Level Co., New Britain, Conn., Rules, Levels and other Tools. Eagle Square Mfg. Co., S. Shaftesbury, Vt., Steel Squares and Rules. E. R. McKean, Washington, D. C., Gauging Instruments.

Group XXVI.

Penn. Geological Survey Commission, Geological Map in Relief (Pennsylvania). Penn. Geological Survey Commission, Geological Charts, Reliefs and Profiles (Pennsylvania). Richard P. Morgan, Bloomington, Ill., Elevated Steam Railway. Detroit Bridge and Iron Works, Detroit, Mich., Bridge over Missouri River at St. Joseph, Mo. F. C. Lowthrop, Lowthrop & Henderson, Trenton, N. J., Plans of Iron Bridges and Turn Tables. Gen. Wm. Socy Smith, Maywood, Cook county, Ill., Drawings of Pneumatic Calasoon. Garry Iron Roofing Co., Cleveland, Iron Roofing.

Keystone Bridge Co., Philadelphia, Illinois and St. Louis, Steel Arched Bridge. U. S. Hoisting and Conveying Machine Co., New York, Hoisting and Conveying Machines or Apparatus. The Gunpowder Pile Driver Co., Philadelphia, Gunpowder Pile Driving Machine. Keystone Bridge Company, Philadelphia, Improvements in Pivot or Swing Bridge, Riveted Columns.

Group XXVIII.

Lobdell Car Wheel Co., Wilmington, Del., Cars and Locomotives.

Group XXIX.

John L. Masou, Camden, N. J., Masou's Patent Glass Fruit Jar of 1872. Ella Haller, New York, Fruit Jars.

Centennial Notes.

VULCANIZED FIBER COMPANY. Wilmington, Del. This company make a very interesting display of their vulcanized fiber in Machinery Hall, Section D 9, Col. 65. Vulcanized fiber is an entirely new article of manufacture, consisting of vegetable fiber reduced to a pulp, and then subjected to powerful chemical treatment, whereby the original properties of the fiber are entirely changed, and a new and valuable material is produced, which is already largely utilized, and enters into many branches of mechanical industry. The process and the different articles made are secured by numerous patents, but the goods are sold at less prices than competing articles, while they are said to be of a superior quality to anything of a similar nature ever offered. They are made either hard or flexible, varying in their properties to some extent, according to the uses for which they are intended. The hard fiber is somewhat like horn in its consistency, is very tough and strong, has remarkable durability under friction, and remains permanently elastic under all ordinary conditions of weather or temperature. The flexible fiber closely resembles English sole leather in appearance, and is largely used as a substitute therefor in mechanical appliances, but is much closer grained and far more durable, and being of uniform quality and thickness throughout, cuts without waste. It is used largely in place of rubber for packing. It is extensively used in the manufacture of washers for axles, compression cock washers for plumbers' use, car box washers, fish-bolt washers, journal bearings, bushings, &c., and for the following reasons is said to be superior to leather or rubber: "Is perfectly insoluble in hot or cold water, oil, naphtha, petroleum or alcohol, and is but slightly affected by most of the acids, and is remarkably adapted for plumbers' washers, for the following reasons: 1st. It will not absorb oil or any other fluid, except water; and the only effect that either hot or cold water has upon it, is to cause it to expand and become elastic like leather. 2d. It will not stick to anything, and, therefore, never becomes fast in a faucet like rubber. 3d. These washers outwear three or four leather or rubber ones, and always make a tight joint. 4th. They are cheaper than any other and being made to order of any size, always fit well and are readily applied. They are especially useful as flexible car box washers, for dust guards, oil box covers, &c. Heretofore leather has been used for this purpose, but soon becomes rotten and limp with the oil, rendering them useless, while it is claimed that the vulcanized fiber washers are not effected by oil, grease or petroleum; do not cut the axles, as grit does not adhere to them, and will outwear several leather ones. They are now in use on many leading railroads, and are said to give perfect satisfaction. It has long been a desideratum with railroad officials to provide a permanently elastic compensating cushion at the joints of the rails to absorb the tremendous shocks and vibrations to which the tracks are subjected, and thereby reduce the destructive wear of both rails and rolling stock, and render the roadway comparatively smooth and noiseless. Various devices of rubber, wood, steel, etc., have been tested with only moderate success even when new; but all lacked the essential element of durability, until the introduction of vulcanized fiber, which is not injured by exposure to the weather, or affected by extreme heat or cold, and these simple and inexpensive washers are said to accomplish the desired result. These sheets are made 42 in. wide by 5 ft. 6 in. long, and of any desired thickness from 1/2 to 3/4 in., but are usually cut into half sheets 21 in. wide by 5 ft. 6 in. long for convenience of shipment. These goods are used for carriage washers, gaskets, water packing, plumbers' fittings, car box washers (or "dust guards"), oil box covers, and a great variety of uses. While not in all cases a substitute for leather or rubber in mechanical uses, they are in many positions far superior to either of these articles, and as experience determines the places to which they are especially adapted, they supersede all competing goods for such uses. An immense trade is already done with axle makers, carriage factories and livery stables for carriage axle washers; with railroads and car manufacturers for car box washers and oil box covers; with plumbers and faucet makers for water packings of various kinds; and also with water companies, pump makers, etc., for fire hydrants, pumps, etc.

BUSINESS ITEMS.

VERMONT.

It is reported that the old iron mines near Bennington are to be reopened and worked by the Messrs. Burden, of Troy, N. Y.

Rutland seems at last determined to get the Howe Scale Works, of Brandon. A recent large meeting appointed a committee to further the project, and Governor John B. Page, who owns a controlling interest in the concern, subscribed \$50,000 to the fund. As \$30,000 of the needed \$50,000 were previously promised, and most of the officers of the company are Rutland men, the works will doubtless be removed to that town.

MASSACHUSETTS.

Germany has recently decided to arm her cavalry and artillerymen with revolvers instead of the single-barrel pistols now in use in those departments, and the government wants 90,000 revolvers to be completed within two years. It is understood that the contract for making the pistols is pretty certain to be given to American manufacturers, and that the chances are in favor of the Smith & Wesson Company, at Springfield, or Colt's Works, at Hartford.

The fine point to which railroad building is getting reduced is illustrated in a bit of freight just taken to Northampton by the Connecticut River Road. It was a 10 pound casting sent from Chicago, at a total expense of 16 cents; of this, 4 cents went to the Michigan Central, 4 to the Great Western and 5 to the New York Central, leaving 3 cents to be divided between the Boston and Albany and Connecticut River, the latter getting three-fourths of a cent.

The Boston, Clinton and Fitchburg Road are laying steel rails between Fitchburg and South Framingham, and all passenger and baggage cars are to have the Washburne steel wheel.

Manufacturing interests at Fitchburg are looking up. The machine shops are all running 10 hours a day.

The Weymouth Iron Company have started their mill, and intend to start the two mill factories as soon as the water is high enough.

An invention which will revolutionize the tinware trade of the country has been perfected, after some years of labor, by Henry Martyn, a young Bostonian. It consists of a series of dies by which boxes of all sizes, from the salve box to the preserved fruit and oil cans, are pressed from a single piece of tin, the corners being doubly folded in the process, and no solder being required, though the cans are perfectly air-tight. Flared ware, as dripping pans, are also made. They are durable, very pretty, and—as some dozen a minute are manufactured—very cheap, and in these days of solder poisoning will be especially acceptable to canners of preserved meats.

The Waltham Watch Company, who have just discharged 175 hands, now require the rest to work six days a week instead of five, and at the old pay.

The Douglas Axe Company have just been awarded a government order for 1000 dozen axes.

RHODE ISLAND

One of the plated jewelry manufacturers of Providence has received foreign orders to the amount of \$8000 through the Centennial Exhibition, and there is believed to be a market for plated chains in England.

MAINE.

The shovel factory of H. R. Butterfield, at Waterville, has started up again.

CONNECTICUT.

Brown & Bros., Waterbury, who have been engaged in the manufacture of copper, brass and German silver for a number of years, making these articles in the form of sheet, wire, tubing, kettles, rivets, bars, &c., have recently added to their business the manufacture of silver-plated flat ware, of which they are making a full assortment. The patterns are all new and of rich and elegant designs, all patented.

The Union Knife Company, of Naugatuck, manufacturers of pocket cutlery of all kinds, was established in 1850, and at present employ 50 hands. The factory is 350x25 feet and three stories, and is thoroughly supplied with all needful appliances. The company turn out about 50 dozen pen-knives a day.

The assignees of the Woodruff Iron Works began Wednesday, the 4th, the last payment on the preferred claims against the concern. These works have started up again under new auspices, and all the departments are now under way, some heavy castings having already been made.

Plume & Atwood Co., Thomaston, are running eight hours per day, four days in the week. Seth Thomas Clock Company eight hours per day. The latter company are putting a tower at the end of their "Marine Shop," in which will be placed one of their Tower clocks.

NEW YORK.

The Robinson Chilled Plow Company, of Syracuse, sold and delivered between 600 and 700 plows, and for the spring trade will make 10,000. A force of 60 men is employed at present, and when the works are run up to their full capacity about 50 plows per day can be made, beside extras.

Bliss' Smelting Works, Williamsburgh, Long Island, are devoted to refining dross sweepings of pewter, Britannia metal, refuse from tin works and the like. Manufacturers are finding it to their advantage to send their dross to a refining establishment to have it reconverted into the metal or alloy which they are using rather than to attempt to do the work themselves. It has been found by comparison that this course saves from 30 to 40 per cent. over the old way, where each manufacturer attempted to "sweat out" the metal from the dross. This saving is effected by having proper metallurgical skill, with fluxes and suitable apparatus. Among the products of Mr. Bliss' works are soft lead, type metals, quicksilver,

zinc, tin and its alloys, etc. The capacity of the works is 10 tons per day.

PENNSYLVANIA.

The Newcastle *Courant* says: The old mill, Etna, was put in operation on Monday last, and we understand is to run double turn. As soon as enough iron is made the mill factory is to be started. A rumor that the works of Reis, Brown & Berger are to resume operations soon was in circulation the other night. If this is true times will get easier in Newcastle shortly.

The Virginia (Nevada) *Enterprise* says of the Savage cable: The new steel wire cable, just received by the Savage Mining Company, is one of the finest ever brought to the Comstock lode. It was made by the Hazard Manufacturing Company, of Wilkesbarre, and is 2½ inches in diameter, and 4000 feet long. It is not a tapering rope, but is of uniform diameter throughout. It is round, and is composed of 343 steel wires, so completely twisted and laid in together as to form almost a solid mass of iron. The weight of the cable is 36,000 pounds.

The Thomas Iron Company have put in blast Nos. 7 and 8 furnaces at Lock Ridge, and on Monday last lighted No. 2 at Hokendauqua, making six furnaces in blast out of ten belonging to the corporation. It is announced that all their anthracite furnaces, eight in number, will be put in blast. This will require a goodly number of men, and although wages are extremely low, yet men are satisfied to work in order to keep the wolf from the door.

The Lehigh and Wilkesbarre Coal Company have resumed work, with a full force on full time, at all their collieries. Large sales of coal have been made by the company to iron manufacturers in the Lehigh who are putting their furnaces into blast, and the daily shipments on the New Jersey Central Railroad aggregate 15,000 tons. About 15,000 men are employed by the company, and the resumption of mining, together with a recent payment to the men, has brightened business in the Wyoming region.

The fire was started in the Lebanon Furnace No. 1, Hon. G. Dawson Coleman's, on Thursday morning, the 5th.

H. F. King, of Corry, has in operation a combined road engine and steam-power for threshing or other purposes. It gives promise of proving a success. It was built by himself at the Novelty Works, Corry.

The New Castle *Guardian* says it is rumored that a change in the firm of Reis, Brown & Berger, of that city, is about to take place. The rolling mill and other works of this firm are estimated to be worth about \$1,500,000.

PITTSBURGH AND VICINITY.

The Lucy Furnace is relined and fire was put in to dry it out on the 29th ult. The furnace will be blown in early in November.

The Shoenberger Furnace in blast is doing most excellent work, making 342 tons a week. The furnace is only 13 feet bosh by 62 feet high. The grade of iron is very open, the difficulty being to keep it down to mill iron.

The Edgar Thomson Steel Works will shut down Saturday for repairs, and will probably not resume operations before December 1st. They have been running very regular for some time past, making about 191 tons per day.

Mr. James Skelding, formerly manager at the Lucy, and more recently at the Alice Furnace, Ironton, has resigned at the latter place and is again in Pittsburgh.

The mill of H. Lloyd, Son & Co., which shut down some two weeks since, is again in operation.

All of the window glass factories in this city are idle on account of the strike of the tender boys. We believe that all Western factories are in the same condition except the one at Ottawa, Ill., which has yielded and is in operation.

One cent and three-quarters per bushel of eighty pounds is being paid to the miners in the fourth pool on the Monongahela River, and three or four works are in operation at that price.

The miners at Kinney & Pasmore's Coal Works, opposite McKeesport, are to go to work in a few days at two cents per bushel.

WEST VIRGINIA.

The hinge factory, Wheeling, has been idle for a few days.

OHIO.

Cartwright, McCurdy & Co.'s two mills, the Youngstown Rolling Mill and Brown, Bonnell & Co.'s Works, at Youngstown, are now in active operation.

The Himrod Furnace is again running on Bessemer steel.—*Exchange*. Is it possible that Kelley's idea after all is going to succeed, and steel be made in the blast furnace crucible?

The Milburn Wagon Works, at Toledo, were burned on the 29th ult. Loss, \$350,000; insurance, \$135,000.

Hotchkiss & Gaylord, bolt manufacturers, Cleveland, are experiencing a gratifying revival of trade. They have received orders in the first two days of this month to keep them busy for two weeks.

Sandusky Tool Co. report business fair. They employ about 75 men. Their planes are standard.

The Akron Knife Works are putting in additional machinery, made in Fitchburg, Mass., which will give employment to six new hands.

WISCONSIN.

The Chicago *Inter Ocean* of Oct. 5th, says: A secret meeting of the creditors of the Milwaukee Iron Company was held here to-day. They resolved that the company could make an arrangement by which all debts could be paid without proceedings in bankruptcy, and appointed a committee to so inform the directors. They also appointed a committee to throw the company into bankruptcy if the directors attempt to avoid their debts. The committee waited on the directors, but got no satisfaction. A quarrel ensued, and the committee were informed that they were meddling

with business not their own. The creditors then appointed a committee to investigate the accounts of the company, and adjourned to the 17th inst. The property is worth about \$4,000,000, and this seems to be a fight for possession.

TENNESSEE.

The Roane Iron Company are running both mills double turn, and are pressed with orders. They are now puddling for the new Schofield merchant mill, using the Chattanooga Iron Company's iron exclusively.

MICHIGAN.

The Escanaba Furnace, which before the panic could not have been bought for half a million dollars, was sold at auction on the 21st ult., to A. B. Meeker, of Chicago, for \$105,000. This includes the furnace plant, 30,000 acres of woodland, all kilns, tenements and personal property of the company. The furnace will soon be put in blast.

INDIANA.

Stack No. 1 of the Vigo Iron Co.'s furnaces, at Terre Haute, will go into blast this week or next, as the Wabash Iron Co.'s bar mill stock of pig iron is nearly exhausted. The two corporations comprise the same stockholders, and they find it is still cheaper in this section to make iron than to buy it, although the reverse is the case in many other iron producing regions. The Vigo Iron Co. use Brazil block coal exclusively.

In the Kennebec River an engineering work for the improvement of navigation is going on, which is somewhat similar, though upon a smaller scale, than that at Hell Gate. "Dry Rock," near Richmond, is being removed under the direction of General Thom. In the neighborhood of this rock there is a very strong tidal current. In one blast, recently, there were four holes drilled 17 feet deep, and filled with vulcan powder. The mine was exploded by means of a battery, and the discharge removed a mass of rock weighing about 370 tons a distance of 30 feet. The Kennebec is the chief ice mart of the country, and a heavy trade in the summer months passes up and down that river.

Special Notices.

American Manufactures in England.

A merchant of long experience in Birmingham England, will devote time to the sale of, and to the procuring of orders in the English market for American manufactures. For particulars apply to the Office of *The Iron Age*, 10 Warren St., N. Y.

To the Hardware Manufacturers.

Last year, at the meeting of the Western Hardware Association, held at Cincinnati, a few manufacturers and their representatives were present and organized a temporary "Manufacturers' Association." The "Western Hardware Association" was invited to attend a banquet, which was accepted, and on that occasion a banquet was tendered the members of the Association by the manufacturers, to take place at their next annual meeting, and this meeting will be held in St. Louis, Mo., October 17, 1876.

As this meeting promises to be very important, and one in which the manufacturers are directly interested, it is hoped that every manufacturer of hardware and kindred lines will be represented, and it is desired, as far as possible, that the leading or representative member of each firm be present.

All who intend going, write at once to "Committee Manufacturers' Association," Lindell Hotel, St. Louis, giving their names, also the name of their firm. This will facilitate the object in view. Per committee, Manufacturers' Association.

"No. 1 Business Chance."—For Sale—rare business chance—I offer my entire stock of Hardware, Tools and House Furnishing Goods for sale privately. Stock on hand, about \$3500. The stand is good and rent low. Best of reasons given for selling. For further information address G. A. NOLTING, 116 Broad St., Richmond, Va.

DISCOUNT LISTS.

Hinges (Stanley Works) list... 10¢ to 50¢ each, 75¢. Screws, Bolt, Nut, Washer, &c., 10¢ to 60¢. "2" 75¢. Screws, Bolt, Nut, Washer and Bolt List.—Contains all the lists and discounts that are used. Price, \$1.00. Dayton & Lamberson, 97 Chambers St., N. Y.

NEW YORK, Sept. 30th, 1876.

The style of our firm will be hereafter

McCOY & CO.

Mr. Irving VanWart retires, and Mr. Isaac Jenks, Jr., becomes a partner from this date.

VANWART & McCOY.

SPECIAL NOTICE

A new style of **MEN'S SINGLE GUNS**, in addition to the former line of A. Simon's, Liege, now offered.

SILESIA SHEET ZINC, Imported by **LOUIS WINDMULLER & ROELKER**, 30 Reade Street, N. Y.

Specialties of Wrought, Cast, or Sheet Iron or Brass.

Made to order in a SUPERIOR MANNER, AT LOW PRICES, by the **CORRUGATED METAL CO.**, East Berlin, Conn.

WANTED.—A first-class business man familiar with machinery and manufacturing, capable of handling large bodies of men, desiring a responsible position. References satisfactory. Address, **IRON AND STEEL**, Care of P. O. Box 813, Bridgeport, Conn.

VENTILATING & STEAM HEATING.

A thoroughly competent engineer, with extensive experience in the above line, desires employment. Address **M.**, Office of *The Iron Age*, 10 Warren St., N. Y.

Special Notices.

TO LET, A Light, Handsome Office.

Possession Immediately.

HERMANN BOKER & CO., 101 Duane Street, N. Y.

NOTICE! POND'S TOOLS.

The undersigned has assumed the Personal Property, including accounts, finished and unfinished machinery, good will &c., connected with the manufacture of MACHINIST'S TOOLS as conducted by Mr. Lucius W. Pond since 1847, and will continue the said business at the old stand, cor. Union and Exchange Sts., Worcester, Mass., under the name of **DAVID W. POND**, Successor to Lucius W. Pond.

CARD.—Having assumed the business mentioned above, I solicit Inquiry and Patronage, with guarantee that present standard of Workmanship, and quality of Machinery shall be maintained. A large quantity of NEW AND SECOND-HAND TOOLS, ALL SIZES AND SIZES, For Sale at Low Prices. Send for list of second-hand tools. Store at 98 Liberty St., New York, will be discontinued from Feb. 1, 1878, and all sales made from manufacture.

Respectfully, **DAVID W. POND**, Successor to LUCIUS W. POND.

Proposals will be received up to December 1st 1876, by the Trustees of the New York and Brooklyn Bridge, at their office 21 Water St., Brooklyn, N. Y., for the manufacture and delivery of 3400 net tons of No. 8 Galvanized Steel Cable Wire, to be used in the construction of the main cables of the East River Suspension Bridge.

Printed specifications containing full information will be furnished upon application to this office.

W. A. ROEBLING, Chief Engineer.

ALLIS, BULLARD & CO. (Limited),

Railway Supplies, Machinery & Metals,

14 Dey Street, New York.

Offer for immediate delivery the following list of Tools and Machinery, viz: One 12 x 36 inch Green Cut-off Engine, in perfect order; one Brown & Sharpe Universal Milling Machine; one do. No. 1 Screw Machine with lot of Tools; one 8 inch Pratt & Whitney Shaper; one do. 16 inch Planer, and 13 inch x 4 feet Lathes; one Pond Planer, 22 x 5 ft.; two Fowler Presses, one 800 lb. Merrill Dyer, and lot 15 and 18 inch Lathes; all in excellent condition.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 29 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/4; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

Machine Tools, SECOND - HAND

One Mason Milling Machine. One 15 in. swing 9 ft. bed Screw Cutting Lathe. One 15 in. swing 6 ft. bed Screw Cutting Lathe. One 21 in. swing 8 ft. bed Screw Cutting Lathe. Three Common Milling Machines. One No. 4 Smith & Garvin Milling Machine. Two No. 3 Smith & Garvin Milling Machines. One 2 Spindle Profiling Machine. One No. 3 Brown & Sharpe Screw Machine with churning bar. Three 4 Spindle Drills. Four 21 inch swing "Pond" Up-right Drills. One 5 ft. Radia Drill. One 22 in. x 4½ ft. Planer. One 24 in. x 35 ft. Planer. One 3000 lb. Ferris & Miles Hammer. One 1000 lb. Ferris & Miles Hammer.

The above tools have been little used, will be sold very low and can be seen at the store of **GEORGE PLACE**, 121 Chambers & 103 Reade Streets, N. Y.

Steel Castings.

Solid and Homogeneous. Guaranteed tensile strength, 15 tons to square inch. An invaluable substitute for expensive forgings, or for Cast Iron requiring great strength. Send for circular and price list to **CHESTER STEEL CASTINGS CO.**, Evidine St., Philadelphia, Pa.

Wanted—A Partner,

In a foundry and machine business, already well established. Locality splendid and healthy.

A practical man who is already well established.

Address **CAR WHEEL FOUNDRY**, P. O. Box 134, Selma, Alabama.

Briesen's Patent Agency

FOR SECURING INVENTIONS, TRADE MARKS, &c., IN AMERICA AND EUROPE.

No. 258 Broadway, New York. **A. V. BRIESEN.**

Important to Manufacturers.

BISSELL, WELLES & MILLET,

Auctioneers and Commission Merchants, No. 15 Murray St., New York.

Solicit from Manufacturers and others consignments of Machinery and Cutlery for our weekly Auction Sales to the Trade, or at private sale for cash, as desired. Our facilities for moving large lines of goods are unsurpassed. Advances made if desired.

AUSTRALIA.

AGENCIES.—B. O. HOLTERMANN, of B. O. H. & Co., Sydney, Australia, will undertake Agencies on reasonable terms for the Australian colonies. Undeniable references. Communications up to October 12 may be addressed to him at the *Ashland House*, 4th Avenue and 24th Street, New York; or up to October 5 to Mr. Wilnot, 855 Broad Street, Philadelphia.

The "Common Sense" Hay Cutters,

"VICTOR" CORN SHELLERS, And "PRIZE" CHURN are the best.

A. B. COHU, Manufacturer,

197 Water St., one door from Fulton, New York.

"Everything for the Farm," containing illustrations of 200 of most improved implements or Farm, sent on receipt of 10c.

Wanted, Light T Rail.

Parties having for sale 50 to 100 tons of slightly worn, 25 to 35 lbs. T. Rail, can find a purchaser at a reasonable price, by addressing (with price delivered in New York or Philadelphia.)

D. G. ANBLER, Utica, N. Y.

Special Notices.

A. PURVES & SON,

Corner South & Penn Streets, Phila., Dealers in

Scrap Iron & Metals, Machinery, Tools, Shuffling & Pulley, Steam Engines, Pumps & Rollers, Copper, Brass, Tin, Rabbit Metals, Foundry Facings. Best Quality Ingot Brass. Cash paid for all kinds of Metals and Tools.

EXPORT TO RUSSIA!

Having established ourselves in this city for the sale of American Machinery, Hardware, Agricultural Implements and Technical Products generally, we beg to solicit correspondence with manufacturers desirous of being represented in Russia. Familiar with the wants of the country, and as civil engineers, brought in contact with the industrial interests, we are enabled to introduce successfully American products to the trade.

Address **HARTCOG BROS.**, Kasauka 46, St. Petersburg, Russia.

Edson's Steam and Pressure Recording Gauge for Steam or Water.

The inventors of this combined "Pressure Recording Gauge" and "High Pressure Alarm" have, after many years of persistent effort and at great expense, succeeded in perfecting a reliable and accurate instrument for measuring either air, steam or water, when subjected to pressure, and for denoting the same by a tracing upon Edison's Patent Logs or "Charts." No manufacturer or steam user can afford to be without them. Adopted by the United States Centennial Commission for competitive test at the present Exposition, and has also been used by the American Institute for several years past as a standard gauge. To be found at the Centennial Exhibition under D. 9, column 67, Machinery Hall. Circulars sent on application to **M. B. EDSON**, 91 Liberty Street, N. Y.

SPECIAL NOTICE.

I have three patents for Dies, Machinery and Tools for making Angers and Bits, each running seventeen years; dated as follows: Dec. 19, 1860; January 31, 1866, and July 3, 1866. There is a special claim on each of the dies. All persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings**, DEER RIVER, Conn., Sept. 7, 1874.

DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors, 101 & 103 Duane St., N. Y.

For Sale, &c.

For Sale.

An active, paying retail hardware business, well located in Philadelphia.

For information apply to

W. H. & G. W. ALLEN, 113 & 115 Market St., Phila.

For Sale.

Stock of General Hardware, the oldest established and best located in a town of 10,000 inhabitants, at the largest iron ore deposit in the U. S.—10 furnaces and number various machine shops. In the great Lebanon Valley Agricultural District. Terms to suit.

JOHN H. YINGST, Lebanon, Pa.

MACHINERY FOR SALE.

One new Tank Locomotive 21 inch range, cylinders 9 inch bore, 12 inch stroke, drivers with steel tires, weight about 6 tons. Also a second-hand Vertical Engine, 16 inch bore, 16 inch stroke of cylinder, fitted with independent cut-off. All in first-rate order. Address,

WARD, STANTON & CO.,

Newburg, N. Y.

For Sale.

Stock of general Hardware business, long established, doing a good business, 140 miles southwest of Cleveland, O., and 110 miles north of Cincinnati, O. For particulars, address

J. N. A., Box 194,

Bellefontaine, O.

For Sale.

The oldest established Hardware and Stove House in Central Missouri, in a city of 10,000 inhabitants, and doing a thriving business. Reason for selling, sickness in family. For information refer to **SARGENT & CO.**, 37 Chambers St., N. Y., or address,

ELIAS BIXBY,

Box 196, Sedalia P. O., Mo.

For Sale!

Owing to the death of the senior partner, the surviving partner is desirous of disposing of that part of the business of the firm comprising the Stove and Tin trade. Would dispose of the entire business, including Agricultural Implements, Hardware, Paints, Oil, &c., if desired. Terms easy with good security.

L. PEASE & SON,

Hartford, Vermont.

For Sale,

30,000 acres of Iron Ore and Timbered Land, large water powers, furnace and forge producing best quality, at good profit and sale. Accessible to Western and Eastern markets.

OWNER,

271 N. Charles St., Baltimore, Md.



Trade Report.

Office of THE IRON AGE.
WEDNESDAY EVENING, Oct. 11, 1876.
During the past week there has been a decided improvement in the general tone of the financial markets. Gold has declined and securities have advanced. The money market is easy and call loans are freely offered at 2 @ 3 per cent. Prime mercantile paper is quoted at 4 @ 6 per cent. Gold declined during the week from 110 to 108 1/2. The following shows the daily range of the premium:

| | Highest. | Lowest. |
|----------------|----------|---------|
| Thursday..... | 109 1/2 | 109 1/2 |
| Friday..... | 109 1/2 | 109 1/2 |
| Saturday..... | 109 1/2 | 109 1/2 |
| Sunday..... | 109 1/2 | 109 1/2 |
| Tuesday..... | 109 1/2 | 109 1/2 |
| Wednesday..... | 109 1/2 | 109 1/2 |

The stock market was strong and the general list advanced. Among the coal stocks New Jersey Central advanced on a demand to cover speculative sales, and as the result of a reorganization of the management and the retirement of Mr. Johnston from the presidency, in which position he was succeeded by Mr. Knight, of Philadelphia. The principal dealings have been in N. J. Central, D. L. and W., Lake Shore, Michigan Central, Western Union and St. Paul. We give below the quotations of active shares at the close of business to-day.

Government bonds declined during the week, in sympathy with gold. The following is a copy of the 36th call of 5-20 per cent. bonds, which was published on the 6th instant:

TREASURY DEPARTMENT, Oct. 6, 1876.—By virtue of the authority given by the act of Congress approved July 14, 1870, entitled "An act to authorize the refunding of the national debt," I hereby give notice that the principal and accrued interest of the bonds herein below designated, known as "Five Twenty Bonds," of the act of March 3, 1865, dated November 1, 1865, will be paid at the Treasury of the United States, in the city of Washington, on and after the sixth day of January, 1877, and that the interest on said bonds will cease on that day:

COUPON BONDS.
\$100—No. 12,401 to No. 17,000, both inclusive.
500—No. 19,001 to No. 24,100, "
1,000—No. 46,851 to No. 53,300, "

\$5,000,000 coupons.

REGISTERED BONDS.

\$50—No. 5 to No. 300, both inclusive.
100—No. 1,001 to No. 3,450, "
500—No. 1,811 to No. 2,750, "
1,000—No. 5,751 to No. 10,150, "
5,000—No. 3,901 to No. 4,150, "
10,000—No. 3,961 to No. 5,150, "

\$5,000,000 registered.

\$10,000,000 aggregate.

All United States bonds forwarded for redemption should be addressed to the "Loan Division, Secretary's Office," and all registered bonds should be assigned to "the Secretary of the Treasury for redemption."

Lot M. MORRILL, Secretary.
The \$10,000,000 bonds called made, with those called previously, a total of \$50,000,000 of 5 1/2% called since the organization of the present syndicate. Probably an equal amount of the new 4 1/2 per cent. bonds have already been negotiated, and the decline in gold will undoubtedly quicken subscriptions. We give below the closing quotations of governments.

The following is a comparison of the city bank averages for the past two weeks:

| | Sept. 30. | Oct. 7. | Differences. |
|--------------------|--------------|--------------|------------------|
| Loans..... | \$32,428,300 | \$29,323,300 | Inc. \$3,105,000 |
| Specie..... | 14,463,200 | 15,469,200 | Inc. \$1,006,000 |
| Legal tenders..... | 26,753,200 | 28,577,600 | Inc. \$1,824,400 |
| Deposits..... | 227,583,500 | 226,065,500 | Dec. \$1,518,000 |
| Circulation..... | 14,525,800 | 14,585,100 | Inc. \$59,300 |

The foreign trade movements for the week are shown in the following tables:

IMPORTS.

For the week ended Oct. 7.

| | 1874. | 1875. | 1876. |
|---------------------|-------------|-------------|-------------|
| Total for week..... | \$6,479,189 | \$4,632,546 | \$5,030,112 |
| Prev. reported..... | 309,573,072 | 262,906,839 | 220,870,239 |

Since Jan. 1.....\$316,052,261 \$267,588,535 \$25,900,401

Among the imports of general merchandise were articles valued as follows:

| | Quant. | Value. |
|-------------------------|--------|---------|
| Anvils..... | 178 | 1,647 |
| Bronzes..... | 33 | 7,028 |
| Chains and anchors..... | 114 | 4,570 |
| Cutlery..... | 56 | 13,503 |
| Guns..... | 29 | 8,815 |
| Hardware..... | 10 | 583 |
| Iron, pig, tons..... | 18,708 | 18,708 |
| Iron cotton ties..... | 250 | 546 |
| Iron, other, tons..... | 810 | 15,326 |
| Lead, pigs..... | 4,000 | 21,397 |
| Metal rods..... | 400 | 25,363 |
| Nails..... | 43 | 1,743 |
| Needles..... | 16 | 7,487 |
| Old metal..... | 4,741 | 7,487 |
| Per. caps..... | 87 | 5,339 |
| Saddlery..... | 5 | 572 |
| Steel..... | 791 | 13,502 |
| Tin, boxes..... | 31,099 | 107,215 |
| Tin, cakes..... | 63 | 4,499 |
| Tin, 2,000 slabs..... | 185 | 25,547 |
| Wire..... | 34 | 544 |
| Zinc, lbs..... | 8,350 | 637 |

EXPORTS EXCLUSIVE OF SPECIE.

For the week ended Oct. 10.

| | 1874. | 1875. | 1876. |
|---------------------|-------------|-------------|-------------|
| Total for week..... | \$5,340,386 | \$4,877,407 | \$6,003,215 |
| Prev. reported..... | 244,528,733 | 191,847,115 | 202,914,784 |

Since Jan. 1.....\$290,099,009 \$198,734,522 \$208,917,999

EXPORTS OF SPECIE.

For the week ended Oct. 7.

| | 1874. | 1875. | 1876. |
|--------------------------|--------------|--------------|--------------|
| Total for week..... | \$40,887,668 | \$60,777,574 | \$60,777,574 |
| Previously reported..... | 40,567,128 | 40,567,128 | 40,567,128 |

Total since Jan. 1, 1876.....\$40,887,668

Same time in 1875.....\$60,777,574

Same time in 1874.....\$40,887,668

Same time in 1873.....\$40,887,668

Same time in 1872.....\$40,887,668

Government bonds at the close were strong and quoted as follows:

| | Bid. | Asked. |
|-------------------------------|---------|---------|
| U. S. Currency 6s..... | 123 1/2 | 124 |
| U. S. 6s 1881, reg..... | 116 1/2 | 117 1/2 |
| U. S. 6s 1881, com..... | 117 1/2 | 118 1/2 |
| U. S. 5-20 1880, reg..... | 108 1/2 | 109 |
| U. S. 5-20 1880, com..... | 111 1/2 | 112 1/2 |
| U. S. 5-20 1880, new reg..... | 111 1/2 | 112 1/2 |
| U. S. 5-20 1880, com..... | 111 1/2 | 112 1/2 |
| U. S. 5-20 1881, reg..... | 115 1/2 | 116 1/2 |
| U. S. 5-20 1881, com..... | 115 1/2 | 116 1/2 |
| U. S. 5-20 1882, reg..... | 115 1/2 | 116 1/2 |
| U. S. 5-20 1882, com..... | 115 1/2 | 116 1/2 |
| U. S. 10-40 reg..... | 113 1/2 | 114 1/2 |
| U. S. 10-40 com..... | 114 1/2 | 115 1/2 |
| U. S. 6s 1881, reg..... | 114 1/2 | 115 1/2 |
| U. S. 6s 1881, com..... | 114 1/2 | 115 1/2 |
| U. S. 4 1/2..... | 110 1/2 | 111 1/2 |

The following are the closing quotations of active shares:

| | Bid. | Asked. |
|---|---------|---------|
| Atlantic & Pacific R. R. Preferred..... | 17 1/2 | 18 1/2 |
| Chicago & Northwestern..... | 37 1/2 | 38 1/2 |
| Chicago, Rock Island and Pacific..... | 61 1/2 | 62 1/2 |
| Chic. Bur. & Quincy..... | 114 1/2 | 115 1/2 |
| Col. Chic. & Ind. Cent..... | 36 1/2 | 37 1/2 |
| Clev. Col. C. & Indpls..... | 36 1/2 | 37 1/2 |
| Cleveland and Pittsburgh..... | 88 1/2 | 89 1/2 |
| Chicago & Alton..... | 100 1/2 | 101 1/2 |
| Chicago and Alton Preferred..... | 109 1/2 | 110 1/2 |
| Consolidation Coal..... | 51 1/2 | 52 1/2 |
| Canton..... | 27 1/2 | 28 1/2 |
| Del. Lack. and Western..... | 70 1/2 | 71 1/2 |
| Delaware & Hudson Canal..... | 67 1/2 | 68 1/2 |
| Adams Express..... | 60 1/2 | 61 1/2 |
| American Express..... | 60 1/2 | 61 1/2 |
| United States Express..... | 61 1/2 | 62 1/2 |
| Wells, Fargo & Co. Express..... | 85 1/2 | 86 1/2 |
| Eric..... | 10 1/2 | 11 1/2 |
| Harlem..... | 137 1/2 | 138 1/2 |
| Hannibal & St. Joseph..... | 13 1/2 | 14 1/2 |
| Illinois Central..... | 85 1/2 | 86 1/2 |
| Kansas Pacific..... | 4 1/2 | 5 1/2 |
| Kansas & Texas..... | 7 1/2 | 8 1/2 |
| Lake Shore..... | 57 1/2 | 58 1/2 |
| Michigan Central..... | 44 1/2 | 45 1/2 |
| Morris & Essex..... | 94 1/2 | 95 1/2 |
| Milwaukee & St. Paul..... | 28 1/2 | 29 1/2 |
| Mariposa..... | 4 1/2 | 5 1/2 |
| New York, New Haven & Hartford..... | 150 1/2 | 151 1/2 |
| New York Central..... | 102 1/2 | 103 1/2 |
| New York Central..... | 37 1/2 | 38 1/2 |
| Ohio & Mississippi..... | 103 1/2 | 104 1/2 |
| Pacific Mail..... | 23 1/2 | 24 1/2 |
| Panama..... | 127 1/2 | 128 1/2 |
| Pittsburgh & Fort Wayne..... | 100 1/2 | 101 1/2 |
| Pacific of Missouri..... | 9 1/2 | 10 1/2 |
| Quicksilver..... | 11 1/2 | 12 1/2 |
| St. L., Kan. City Northern..... | 5 1/2 | 6 1/2 |
| Tol., Wabash & Western..... | 5 1/2 | 6 1/2 |
| Union Pacific..... | 63 1/2 | 64 1/2 |
| Western Union Telegraph..... | 71 1/2 | 72 1/2 |

GENERAL HARDWARE.

Although the market is not quite as active as it was a week ago, a fair business is being done and a good many buyers are in the city. Prices are very steady, and no change in values of any importance is reported during the week.

On Tuesday next, the 17th instant, the Western Hardware Association will commence their annual session at the Lindell Hotel, St. Louis. On the opposite page we print among "Special Notices" a card addressed "To the Hardware Manufacturers," issued by the Manufacturers' Association, to which we invite the attention of those manufacturers who desire to be represented at the convention.

We have received the following letter:

To the Editor of The Iron Age: Now that the mind of the Jobbing Hardware Trade is agitated on the subject of the "Drumming System," why would it not be well for the Western Hardware Association, which convenes at St. Louis on the 17th inst., to take up and discuss the question at its length. If it is capable of being satisfactorily solved this body is the one to do it.

HEAVY JOBBER.

In Foreign Hardware there is very little to note. The demand continues fair for seasonal goods, but considering the unusually large number of buyers that have visited this market since the opening of the season, the amount of business is not encouraging. There are no changes in values to report.

We have heard of some irregularity in the quotations for the Snell Mfg. Co.'s goods, which can only be accounted for by the intense desire to sell regardless of established prices or living profit. J. Clark Wilson & Co. quote these goods at discount 25 per cent., which is nominally the price to regular trade. To large buyers an extra discount is allowed, and to the jobbing trade special terms are made.

The Yale Lock Mfg. Co. quote Differential Pulley Blocks at discount 20 per cent. They are the sole manufacturers of these goods in this country, having, as our readers are aware, purchased all the patents bearing on their manufacture.

There is little to report regarding nails, the demand continues fairly active at unchanged figures. We quote as before: 10d. to 60d., \$3-10, net, with a discount of 10 cents per keg for orders of 300 kegs and over.

The following circular explains itself:

Office of F. STURGES & CO.,
Importers of TIN PLATE & METALS,
Manufacturers of
TINNED, STAMPED AND JAPANESE WARES,
72, 74 and 76 Lake Street,
Chicago, Sept. 30th, 1876.

Having transferred our business to the Chicago Stamping Company, whose card appears below, we cordially commend them to the confidence and good will of the trade.

The same hands who have managed our business for the past eleven years will take charge of the affairs of our successors, but with enlarged facilities and increased capital.

Respectfully yours,
F. STURGES & CO.

Board of Directors: Frank Sturges, E. Morgan, Jr., Edward Cheetham, Wm. S. Potwin, H. S. Slaymaker.

The Chicago Stamping Co. (Incorporated Sept. 8, 1876) successors to F. Sturges & Co., manufacturers of Kitchen and House Furnishing Goods, Tinners' Supplies, &c.; jobbers of Tin Plate and Metals. Office and salesrooms, Nos. 72, 74 and 76 Lake Street.

Frank Sturges, president; Wm. S. Potwin, vice-president and general manager; E. Morgan, Jr., secretary; H. S. Slaymaker, treasurer.

Paid-up capital, \$350,000.

The demand for House Furnishing Goods is active. S. Whitman, No. 233 1/2 Water street, has issued the following price list for Coal Ho is, which is subject to discount 15 per cent.:

| | Coal Hods. | No. 14 | 15 | 16 | 17 | 18 in. |
|-----------------|------------|--------|--------|--------|--------|--------|
| Japanneel..... | \$4 00 | \$4 20 | \$4 40 | \$4 75 | \$5 40 | |
| Galvanized..... | 6 00 | 6 25 | 6 50 | 7 50 | 8 50 | |

The attention of the trade is invited to the advertisement of Smith's Patent Improved Adjustable Hollow Auger on page 20. We believe the article is one of genuine merit. It is for sale by C. M. Ghisley, of Philadelphia.

We notice the introduction of a new article of Tubing and Piping in the market, in shape of a spiral formed Tube, both riveted and locked in the seams, forming a most substantial and durable article in the way of galvanized house leader, smoke and work pipe, and also for general work pipe purposes, as the lengths are continuous and not made in short joints, as is the case with hand-made pipe. It can be worked with great economy and advantage.

J. J. Spowers, formerly agent of the National Tube Works Co., is the owner of the patent for manufacturing this new class of Tubing. The various styles of spiral formed Tubes may be seen at 23 Cliff street, N. Y.

BRITISH IRON MARKET.

(Specially reported by cable for The Iron Age.)

WEDNESDAY, Oct. 11, 1876.

Scotch Pig.—The demand is steady, and a large business is doing. Prices are firmer. We quote as follows for makers' irons:

| | |
|------------------------|--------|
| Gartsherrie No. 1..... | 66 1/2 |
| Cottbus No. 1..... | 69 1/2 |
| Glenarnock No. 1..... | 64 1/2 |
| Eglinton No. 1..... | 58 1/2 |

Manufactured Iron.—The demand continues to improve and prices are steady. A fair business is doing.

Rails are unchanged.

IRON.

American Pig.—Sales aggregating about 3300 tons, and including 2500 tons Thomas Irons, Nos. 1, 2 X and 2 at \$20 and \$22, Hoboken delivery, are reported during the week. The condition of the market is variously estimated, some makers having plenty of orders while others report a lifeless condition of affairs. The Thomas Iron Company have lately increased their production by putting in blast two of their idle furnaces; they now have six furnaces running. As regards prices the tone of the market is decidedly strong, and we continue to quote No. 1 Foundry, \$22; No. 2 Foundry, \$20; Gray Forge, \$19 @ \$20.

Scotch Pig.—Sales of Scotch Iron are limited to small parcels for immediate use. We do not hear of any late arrivals, and we quote as before: Cottbus, \$28 1/2; Glenarnock, \$27 1/2; Eglinton, \$26 1/2.

Rails.—The transactions in Iron Rails continue to be of a limited character. During the week a lot of 500 tons Iron were sold at a private price. We quote Iron at tidewater, \$30 @ \$43. In Steel Rails no new business is reported, and we quote, nominally, \$55 at tidewater.

Old Rails.—We quote, on a dull market, \$21.

Scrap.—We continue our quotation of \$26 @ \$27 for Wrought, from yard.

The Cambria Iron and Steel Works have issued the following under date of 5th instant:

CAMBRIA IRON AND STEEL WORKS,
JOHNSTOWN, PA., Oct. 5, 1876.

E. Y. Townsend, Esq., President Cambria Iron Co.—Dear Sir: I am in receipt of yours of 4th inst., with the inclosure of a letter from an officer of the Western Railroad Company, asserting that agents of certain rival steel works have reported "that Cambria Steel is not good, and that it has been condemned by the Pennsylvania R. R." In answer thereto I desire to state that the Cambria Company has under its present management, for over 21 years, produced and sold to the railroad companies throughout this country more than one million tons of rails, and during this period maintaining friendly business relations with the officers of all the leading railway lines, it has received from them voluntary assurances of their entire satisfaction.

I have recently heard of the circulation of vague rumors detrimental to the character of Cambria Steel Rails, but until my attention was called to the letter above mentioned, I did not deem the slanders worthy of notice, for the motives prompting them may be understood by considering their source, which is not of such a character as to disturb the confidence of our customers.

Least, however, parties, who have not previously dealt with the company, may be influenced by these false reports, I should advise publishing the certificates voluntarily furnished by the Pennsylvania Railroad Company, since they fully answer and refute the slanders referred to.

Considering that the service on the Pennsylvania Railroad, from its heavy tonnage and the general character of its way, furnishes probably the severest test of rails in the world, these certificates will especially commend themselves to officers of other roads, who, being solicitous for the best interest of their stockholders, will regard the experience of this company as of great value to themselves.

Believing the adoption of the above advised course to be the best for our general interests, I am,

Yours, very truly,
(Signed) D. J. MORRILL, Gen'l Manager.

PENNSYLVANIA RAILROAD COMPANY,
First Vice-President's Office,
PHILADELPHIA, April 7, 1876.

E. Y. Townsend, Esq., President Cambria Iron Co.—Dear Sir: In response to your inquiry as to our experience with and opinion of Cambria Steel Rails, I have to say we commenced using them in August, 1870, and have since that time received nearly 45,000 tons for our main line and 25,000 tons for our leased lines, and it affords me pleasure to say that our reports show that the Rails have proved to be equal to any other Steel Rails that we have used, including most if not all the prominent foreign and domestic makes. Yours truly,

(Signed) G. B. ROBERTS, Vice-Prest.

(Subject) Rails manufactured by Cambria Iron Company.

PENNSYLVANIA RAILROAD COMPANY,
OFFICE OF ENGINEER OF MAIN TRUNK OF WAY,
233 South Fourth Street,
PHILADELPHIA, October 8, 1876.

Cambria Iron Co.—GENTLEMEN: We have an accurate report made every month of the age of worn out and broken Rails taken up on all the roads controlled by the Penna. R. R. Co., and we find that the Steel Rails made by your Company give fully as good satisfaction, last as long, and with fewer broken Rails, than any other manufacture we have in use.

The percentage of the amount recovered from our tracks in 1875, in proportion to the amount used, is lower than any other manufacture we have in use.

The report for the first eight months of 1876 shows still better results. We have now in use nearly 450 miles of Steel Rails made by the Cambria Iron Co. in our main tracks.

Respectfully,

(Signed) Wm. H. BROWN, Eng. M. W.

PENNSYLVANIA RAILROAD COMPANY,
First Vice-President's Office,
PHILADELPHIA, Oct. 8, 1876.

Mr. Ed. Y. Townsend, President Cambria Iron Co.—Dear Sir: In reply to your inquiry I am pleased to say that our experience with your steel rails the past summer gives us no reason to change our views—but rather confirms them—as expressed in my letter of April 7th, 1876.

Very truly,

(Signed) G. B. ROBERTS, Vice-Prest.

METALS.

Copper.—Transactions since our last report have been quite considerable, 1,500,000 pounds Lake Superior having sold to arrive, deliverable in October, November and December, at 21c., and 450,000 ditto on the spot at the same figure. This pretty much closes out what the mines

have left to dispose of all the way to the close of navigation. Very little is to be had now at 21c.; in fact they now all hold at a higher figure, and the market closes with a very firm feeling at 21c. @ 21 1/2c. Baltimore we nominally quote 21c. The tendency in the London market seems to be irresistibly toward a still higher range. On Saturday last the quotation thence per cable came £70 for Best Selected, and £73 for Chilli Bars, which was an improvement of 10/. Since then we are told there are private dispatches in this city to the effect that Chilli Bars advanced to £75. 10/. Should this quotation be confirmed it would go to show that the speculators have taken a firm hold of the metal on the other side, and as it is situated, there is no telling what figure they may push it to. Mail accounts are at hand from England to the 28th ult., and we copy therefrom the following passage: "Copper has shown decidedly more firmness this week, and purchases were made yesterday at £1 advance on our last advice. To-day a further increase of £1 is asked, and probably 10/ or £1. 10/ in all would have to be paid, leaving Best Selected £79. 10/." No change has been made in quotations of manufactures, which remain 31c. for Sheathing, and 32c. for Bolts and Braziers; Bronze and Yellow Metal Sheathing, 20 1/2c. @ 21c., and Yellow Metal Bolts, 26c. @ 28c.

Tin.—Dealings in Tin have been restricted to a moderate jobbing trade, yet

June) was altogether 540 tons stream tin, there being no input tin, showing a decrease of 154 tons from May and June, 1875. The receipts for the past quarter were 507 tons, showing a decrease on the same quarter last year of 230 tons; and the receipts for the past half year were 989 tons, showing a decrease of 228 tons of stream tin. The above figures show that the continued low price of tin in London has at last affected the supply, although to a very inconsiderable extent as yet. A more remarkable fact is disclosed that the output of tin has come down during the past two months; smelting on the field has turned out a failure, and all the furnaces are down, and the men dismissed. The total yield I hope to be able to give by next mail, and until then you are unable to draw any conclusions from the above figures, as the quantities of stream tin forwarded by the other two routes to the coast may be very much in excess of last year; or very much less, and until I get the actual figures during the last two or three months there has been considerable activity, and I calculate that our export of this metal will double itself this year. I hear of some large contracts for the supply of Antimony Ore by the Neardle and other Antimony mines to Melbourne smelters.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., Sept. 25, 1876.
THE IRON AGE MEETING

has been held during the week at Leeds, and has been a great success, not so much in respect of the quality of the papers read as in the practical knowledge exchanged or wholly gained by the visits to the many famous Yorkshire iron works which surround Leeds, amongst them being the world-renowned Lowmoor and Bowling establishments. The neighborhood is not so much distinguished for the quantity of iron it produces, but for quality it has no rival the world over. You will find all the papers read in the columns of the weekly press, so that I shall not dwell upon the subject in this place further than to say that there was a capital attendance of members from all parts of this country and some Continental countries, including most of our leading metallurgists. Dr. Siemens is the next president elect.

THE TRADES UNIONS

have also been in annual session this week at Newcastle-on-Tyne. The number of members (nominal, at any rate) represented was stated to be over 500,000, but I fancy that some discount may be deducted from that total. The largest unions are the Miners' National Association (140,000 members), the Glasgow United Trades Council (40,000), Amalgamated Miners (50,000), the Amalgamated Engineers (44,000), Amalgamated Iron and Steel Workers (20,000), Amalgamated Railway Servants (30,000), National Agricultural Laborers' Union (60,000), Federal Union of Agricultural Laborers (30,000), carpenters and joiners (16,000), stonemasons (25,000), iron foundries (13,000), boiler makers and iron shipbuilders (13,000), with sundry others counting 6000 to 10,000 members. The Congress sat the whole week, and indulged, as is its custom, in a vast amount of talking, but did very little real work, that being left (as usual) to the Parliamentary Committee. There were three lady delegates present—a contingent which somewhat overawed the more timid delegates of the other sex.

FURTHER COMMERCIAL FAILURES

have to be recorded week after week—some of them of rather large proportions. In my list there is, first, the case of Thomas Leighton, the plate worker and watch dealer, of Snow Hill, Birmingham, who owes £12,385, and has assets worth £2474. Next comes Mr. Thomas Smith, wool stapler of Halifax, who owes £28,000, and is expected to be able to pay 6/ in the pound out of his assets. Then, Mr. John Braumall, of Sheffield, whose liabilities are set down at £200,000, and whose assets may yield 10/ in the pound. At Walsall it was shown to a meeting of creditors that Mr. Arthur Hills, chemical manufacturer, owed £55,935, with assets valued at £2396. Liverpool, which has latterly been very busy in commercial matters, furnishes the next instance, that of Messrs. Thomas Duguid & Co., River Plate merchants, of Liverpool, Manchester and Buenos Ayres, whose debts are £150,000, but who have such considerable assets that everybody will probably be paid in full. On Saturday the creditors of Messrs. Swan, Coates & Co., of Middlesbrough, met at that town, and the statement presented showed the liabilities to be £108,980, with assets set down at £104,384. At the meeting of Thomas Vaughan & Co.'s creditors, the debts were shown to be £270,390, and the assets £1,324,344, showing a surplus of £263,948.

FATAL FIRES IN LONDON.

During the week now ending there have been fires in various parts of the country, but not of serious dimensions, with the exception of a couple in the metropolis, which have had fatal results. In one case a fire broke out early in the morning on the premises of Mr. Mantor, Mill street, Hanover Square, and three females—a mother and two daughters—were burnt to death. The other conflagration destroyed the Telegraph House, Leyton Road, Stratford New Town, and burnt a young mother and her child to death. In all the London fires there are evidences of carelessness on the part of the local or metropolitan governing bodies, the fact being that London is so unwieldy that Bumbleton is unable to cope with it, yet persistently refuses all offers of assistance.

BUT FEW EXPLOSIONS

have been placed on record since the date of my last. One of the number occurred in some brickfields near Sevenoaks, Kent, at which place a boiler ruptured itself and recorded the fact in a more or less pronounced manner on the bodies of twelve persons standing near. Three of the injured were severely hurt, and four others are rapidly sinking in the same hideous direction. Then we have had our customary little colliery explosions; this time at the Maryville Pit, not far from Glasgow, where the foul demons of the mine got loose and exploding most dramatically killed two poor fellows and suffocated four others. Another pit disaster was that at Messrs. Bazoull's Colliery, near West Bromwich, where five miners on the alert with naked candles were surprised (?) by an explosion which injured all so seriously that three are now in a dying condition.

RAILWAY ACCIDENTS.

Of railway accidents, as with the making of books, there is no end, neither hath it at any time entered into the mind of man to conceive what railway officials are capable of when thoroughly aroused. Amongst the matters of this kind during the week have been an acci-

dent near Gainsborough, where the draw bar of some wagons laden with steel rails broke and caused the rails to wage a fierce and successful contest with their captive brethren. The permanent way suffered greatly. At Bradford a passenger train bravely charged at a pilot engine and put it to instant flight, but suffered itself even more severely than the enemy, the passengers feeling not a little bewildered by the result. Then, again, at Skipton a "fast" goods train disdainfully "let out" at a slow goods train which was shunting, but performed the smash so clumsily that the Midland Company (which owned both trains) have several thousand pounds to pay, and some few officials now speak of the matter with mournful feeling.

COAL AND METAL STATISTICS.

The returns of the quantities and value of the coal and metals produced in the United Kingdom, included in the Statistical Abstract, just published, bring the tables down to the end of 1874. In that year the quantity of coal raised was 125,043,257 tons, the value of which, at the place of production, was £45,849,104, or an average of 7 1/4 p. per ton. The supply was nearly 2,000,000 tons less than in 1873, but it was 1,500,000 in excess of 1872, and largely above the preceding years. Compared with the previous 14 years, the coal produced has risen from 83,635,214 tons in 1861 to 124,043,257 in 1874, giving an average increase of nearly 3,000,000 tons a year; and the value at the place of production has risen from £20,908,803 to £45,849,104, being at an average of nearly £2,000,000 a year. The value of a ton of coal at the pit in 1861 was a fraction under 5/ a ton, as compared with 7 1/4 p. in 1874, showing an increase in value of about 2 1/2 p. per ton every year. The quantity of pig iron raised in 1874 was 5,991,408 tons, as compared with 3,712,300 tons in 1861; the value in 1874 being £16,476,373, or £2. 15/ per ton, and in 1861 £9,280,975, or £2. 10/ per ton, thus showing an increased value of 5/ per ton in the 14 years. The yield of fine copper from British ores has decreased to a great extent. In 1861 the quantity produced was 15,381 tons, the value at the place of production being £1,572,489, while in 1874 the quantity was only 4981 tons, valued at £147,801. The value per ton in 1861 was £102. 11/, and in 1874 it was £29. 18/, a reduction of 72 1/2 p. per ton. The quantity of metallic lead produced also shows a falling off from 65,634 tons in 1861 to 58,777 in 1874. The value in 1861 was £1,445,255, or £22. 3/ per ton, and in 1874, £1,208,463, or £20. 3/ per ton, a reduction of 2 1/2 p. per ton. The quantity of white tin produced has considerably increased. In 1861 it was 7450 tons, and in 1874 the yield was 9042 tons, an increase of 2492 tons. The value in 1861 was £910,702 or £122. 4/ per ton; and in 1874 it was £1,077,712, or £108. 7/ per ton, a decrease of £13. 17/ per ton. The zinc produced in 1861 was 4415 tons, and in 1874, after considerable fluctuations in the intervening years, it rose to 4740 tons. The value in 1861 was £79,101, or £17. 15/ per ton, and in 1874 it was £106,773, giving a value of £28. 17/ per ton, an increase of £9 per ton in the 14 years. The silver produced from lead ore in 1861 was 569,530 ounces, and in 1868 it rose as high as 835,542 ounces, but in 1874 the produce was only 509,277 ounces. The value in 1861 was £144,191, or 5/ an ounce, and in 1871 it was £127,319, a fraction of a farthing under 5/ an ounce. The value of the other metals has fallen from £250,500 in 1861 to £245,000 in 1874. The total value of the coal and metals shows an increase from £74,662,833 in 1861 to £85,588,264 in 1874, the increase being mainly due to the great rise in the produce and relative value of coal, which has even served to counterbalance the reduction under the head of British gold, the value of which in 1861 was £10,816, but in 1874 only £1540, the quantity produced having fallen from 2784 ounces in 1861 and 5290 ounces in 1862 to 385 ounces in 1873.

SCOTCH PIG IRON

has been more active during the week, and an advance has at length been established in market prices. Despite this, however, stocks continue to be augmented, there being now 86,294 tons in Messrs. Connal & Co.'s stores. Freight rates are unchanged.

Writing from Glasgow, Sept. 22, James Watson & Co. report: "During this week the Scotch pig iron market has been strong with a large business done from 56 1/4 to 56 9/8 cash, and 56 3/4 to 56 10/4, one month open, closing buyers at 56 5/8 cash, sellers, 56 9/8. There has also been a corresponding advance in makers' quotations stimulated by Continental buying. Shipments last week were 10,303 tons, against 11,501 tons in the corresponding week of 1875. We quote:

| G. M. B. at Glasgow | No. 1. | No. 2. |
|--------------------------|--------|--------|
| Gartsherrie, No. 1 | 57 1/2 | 56 1/2 |
| Coltness, " | 56 3/4 | 56 1/4 |
| Summerlee, " | 56 1/4 | 55 3/4 |
| Lanark, " | 56 1/4 | 55 3/4 |
| Carphro, " | 56 1/4 | 55 3/4 |
| Calder, at Port Dundas | 56 1/4 | 55 3/4 |
| Glenarnock, at Ardrossan | 56 1/4 | 55 3/4 |
| Edinburgh, " | 56 1/4 | 55 3/4 |
| Dumfries, " | 56 1/4 | 55 3/4 |
| Shotts, at Leith | 56 1/4 | 55 3/4 |
| Kinnell at Bo'ness | 56 1/4 | 55 3/4 |

The price list of John E. Swan & Bros. varies somewhat from the above. Coltness No. 1 being 68/; Gartsherrie No. 1, 65/; Glenarnock No. 1, 62/6, and Edginton No. 1, 56/6 per ton.

TRADES OF SHEFFIELD.

In trade generally there has been little or no visible change during the week, nor does any alteration appear likely to take place. In the branches referred to more fully in my last week's letter there is still some lively briskness, but in others the depression is becoming even more marked than heretofore. The inquiry for armor plates, for instance, has just fallen off very materially, owing to large Italian and other commissions having been run through without others having been received to replace them. In one case the mills are running alternate weeks only, and in the others short time is the order of the day.

In steel rails, on the other hand, there is an encouraging amount of activity, mostly, as I gather, in the execution of recently received orders on Russian account. Iron rails, except for trains, are wholly neglected. Prices of all kinds remain very low indeed, and do not yield a large percentage of profit.

At a meeting of the shareholders of the Retford Wagon Company, held on Monday, various proposals were submitted for the future conduct of the concern. One of these was to issue £5000 worth of preference shares, and the other proposed to wind up the company at once. Neither course was adopted. A circular issued prior to the meeting stated that the building, machinery, &c., were worth £21,515, and the debts amounted to £13,370 only, so that to wind up by a forced sale would be the height of folly. The shareholders evidently thought so by again adjourning.

The eminent cast steel manufacturing house, William Jessop & Sons (Limited), Sheffield, are concentrating the whole of their workmen at the Brightside Works, Sheffield, in place of having a portion employed at the Park Works as well.

It will interest many to know that German silver has been reduced from 3d. to 6 1/2 p. per pound, according to quality, during the week, making metallic nickel about 7 p. per lb., with 2 1/2 p. per cent. discount off for cash. One or two qualities of house coal have been advanced 6 1/2 to 1 p. per ton during the past few days, but the rise is not general. At Clay Cross collieries

there are orders on the books sufficient to give full work until Christmas, and at other collieries concerns a far stronger demand is being experienced. So far, nevertheless, the supply is in excess of the demand, and is so likely to remain so, that I believe it highly improbable that coal can be advanced more than 1/6 to 2/ per ton during the whole of the winter months.

Some months ago I alluded to the fact that Messrs. William Corbitt & Co., Limited, of the Masborough Stovegrate Works, near Sheffield, had asked their workmen to return to the ten hours' system. The men have refused to accede to this request, but have agreed to work by the piece, instead of by fixed weekly wages.

BRITISH IRON TRADE ASSOCIATION.

On Tuesday a meeting of the British Iron Trade Association was held in the Leeds Town Hall, the president of the association, Mr. G. T. Clark, of Downham, being in the chair. There was a fairly good attendance of iron and steel masters. The president stated that, in accordance with the wish of Lord Derby, an endeavor had been made to collect reports of the state of the iron and steel trade of the country, but it was not complete owing to the trouble of getting returns from Staffordshire and a difficulty in Scotland. He had himself drawn up the South Wales report, which showed that such a depression existed as had not been known for half a century. It was agreed that a report should at once be prepared and sent to Lord Derby. A discussion also took place on the subject of the Russian protectionist movement, and the treaties with France and Germany. The remaining proceedings were not of great general interest.

BIRMINGHAM AND STAFFORDSHIRE.

In some respects there appears to be an opinion prevalent that prices have about seen their lowest, especially as regards pig iron, and that no further reductions are to be looked for. Hot blast pigs are £4. 5/ to £4. 10/, and cold blast, £3. 10/. Single sheets are being sold at £9; or ordinary good, £10; Monmore, £10. 10/. Messrs. Barrows & Sons' B. B. H., £11; best ditto, £12. 10/; and best best ditto, £13. 10/. Messrs. Baldwin's "Severn" singles to 50 w. g. are £13; Wilden B., £16; B. B., £17; B. B. B., £18. 10/; B. Charcoal, £23. 10/; E. B. Charcoal, £25. 10/; Common bars are £8. 10/; ordinary, £7; fair, £7. 10/; medium, £8; best, £9 to £9. 12 1/2. Angle iron (Barrow's best), £11. 10/; Thornaby & Co.'s crown bars, £8; best, £9, and best best, £10; Monmore rivet iron, £10. 15/; ditto best best, £11. 15/; nail rods, £7. 10/ to £8. Sheets and angles are, perhaps, in steadiest request, but on the whole finished iron is only moving off very slowly. The hardware industries also remain quiet.

SOUTH WALES AND MONMOUTHSHIRE.

Last week Cardiff exported 500 tons of iron; Newport, 1463 tons, and Swansea, 1250 tons, the Monmouthshire works being thus much more active than the Welsh establishments. Most of the iron sent out thence is going to Canada, neither Russia nor South America being buyers of iron rails at present. In this report to the British trade (alluded to above) Mr. Clark stated that of a total of 115 furnaces in South Wales 75 were out of blast. The coal trade is still good, there having been 89,997 tons exported from the three ports named above during last week. On the Taff Vale Railway the fitters and engineers are still out on strike against the reduction of wages, and are being supported by the Engineers' Association at the rate of 15/ per man per week.

THE METAL MARKETS

have been firm, and in some respects prices rise higher. Messrs. Von Dodelsen & North say: "Copper—Chill bars have been in demand, and a large business has been done at £70. 10/ to £71 for g.o.b., spot and to arrive, and £71. 10/ for named brands. Wallaroo cake, ex sale, has been sold at £71; Burma held for £70. The English steady; tough, £78 to £71; select, £77 to £73; strong sheets, £83 to £84. Tin—The market for Straits has been a little irregular, sales reported at £72, £71. 10/ and £71, according to terms. Operators are inclined to wait the result of the Banca sale on the 26th inst. Australian, on the spot, sold at £70. 10/ to £71, and now offered thereat. Banca, to arrive from Holland, has been sold at £71 in warehouse here, and Banca at £70 ex ship. The Dutch market with the seriously diminished reduction of English, there being less than one-third raised in this country compared with that of some 15 years ago, it certainly does seem most remarkable that the value is not considerably higher; but the principal reason of the depreciation has simply arisen in sympathy with the great fall in produce generally; and as soon as confidence is restored in the short time is the order of the day. In steel rails, on the other hand, there is an encouraging amount of activity, mostly, as I gather, in the execution of recently received orders on Russian account. Iron rails, except for trains, are wholly neglected. Prices of all kinds remain very low indeed, and do not yield a large percentage of profit.

The Mining Journal remarks: "Copper—The present low price of this metal offers considerable inducement for consumers to lay in large stocks; and, as the chance may not again present itself for many years to come, it will be very unwise if they do not avail themselves at once of this exceedingly favorable opportunity. The quantity of copper in consumers' hands is estimated as being very light, and it is by no means excessive in first time; and, indeed, considering how long business has been dull, it is somewhat astonishing that the accumulation has not been much greater; but this is partly accounted for by the falling off in the imports, which show a decrease of about 1200 tons in comparison with that of last year up to the end of August, and an increase of shipments of about 500 tons; and when this is taken in connection with the seriously diminished reduction of English, there being less than one-third raised in this country compared with that of some 15 years ago, it certainly does seem most remarkable that the value is not considerably higher; but the principal reason of the depreciation has simply arisen in sympathy with the great fall in produce generally; and as soon as confidence is restored in the short time is the order of the day. In steel rails, on the other hand, there is an encouraging amount of activity, mostly, as I gather, in the execution of recently received orders on Russian account. Iron rails, except for trains, are wholly neglected. Prices of all kinds remain very low indeed, and do not yield a large percentage of profit.

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stronger tone that will hereafter prevail. Lead.—The market keeps quiet, and prices are slightly lower. Quicksilver.—The former price of £8 is still maintained. Tin.—The sales this week are of an unimportant character, but prices have been steadily upheld. Liverpool prices are unchanged:

| Scotch Pig Iron; f. o. b. at Glasgow, per ton. | £ | s. | d. | £ | s. | d. |
|--|---|----|----|---|----|----|
| Gartsherrie, No. 1 | 3 | 4 | 0 | 0 | 0 | 0 |
| Good brands, No. 1 | 2 | 17 | 0 | 3 | 7 | 0 |
| " " Mixed Nos. | 2 | 16 | 0 | 0 | 0 | 0 |
| delivery 3 months open | 0 | 0 | 0 | 0 | 0 | 0 |

| Other Iron; f. o. b. in Liverpool, per ton. | £ | s. | d. | £ | s. | d. |
|---|---|----|----|----|----|----|
| Merchant bar | 6 | 12 | 6 | 6 | 15 | 0 |
| Merchant bar, in Wales | 6 | 2 | 0 | 6 | 5 | 0 |
| Staffordshire | 7 | 5 | 0 | 9 | 15 | 0 |
| Hoop | 8 | 0 | 0 | 9 | 0 | 0 |
| Sheet | 9 | 10 | 0 | 10 | 10 | 0 |
| Nail rods | 7 | 10 | 0 | 8 | 10 | 0 |
| Bar, best crown | 7 | 5 | 0 | 8 | 10 | 0 |
| Roller plates | 9 | 15 | 0 | 10 | 10 | 0 |

| Tin Plates; f. o. b. in Liverpool, per bar. | £ | s. | d. | £ | s. | d. |
|---|---|----|----|---|----|----|
| Charcoal, 1 C. | 1 | 5 | 0 | 1 | 7 | 0 |
| Coke, 1 C. | 1 | 0 | 0 | 1 | 2 | 0 |

| Copper; Delivered in Liverpool, per ton. | £ | s. | d. | £ | s. | d. |
|--|----|----|----|----|----|----|
| Rail and Sheathing | 84 | 0 | 0 | 85 | 0 | 0 |
| Tile | 78 | 0 | 0 | 80 | 0 | 0 |
| Tough cake | 78 | 0 | 0 | 80 | 0 | 0 |
| Best selected | 78 | 0 | 0 | 79 | 0 | 0 |

HORNS.

Messrs. John Beckwith, Jr. & Co. give the following report, which is of interest to cutlery manufacturers, relative to the horn market. They state that the public sales were well attended and the bidding throughout animated, the greater portion of the horns brought forward being sold. Heavy and light ox were rather lower, but cows fully maintained their value, while buffaloes advanced 4/ to 6/ per cwt. With reference to the public sales of horns this day, Messrs. Robinson & Hadwen report that they were well attended and passed off with good spirit. Prices of River Plate heavy ox and cows advanced about 3/ to 4/ per 133, but light ox did not meet with such good competition and suffered a slight decline. Other sorts of ox and cows brought about last sales' rates. The few good buffalo horns offered brought an advance of about 7/ per cwt.; common and crooked (of which there is a large stock) were not wanted, and all this description was withdrawn for want of competition; since the sale about 35,000 have been placed at a slight advance upon late rates.

The Determination of Manganese in Spiegeleisen.

Mr. Wm. Galbraith communicates the following to the Chemical News:

As is well known to those who frequently have occasion to determine the amount of manganese in spiegeleisen, the usual methods are tedious and require great care on the part of the analyst. If sodium acetate is used to separate the iron, the oxide of manganese retains a considerable quantity of soda, which is extremely difficult to get rid of; and, on the other hand, if ammonium acetate is used, the precipitation of the manganese is very slow, or it requires a large excess of bromine.

Although the above methods have been in use for a long time no attempt seems to have been made to get a more expeditious one, or at all events none have been successful until Mr. Parry showed that a definite oxide of manganese could be got, which enabled him to determine the manganese very accurately and expeditiously. His method is simply to dissolve a weighed quantity of the spiegeleisen in nitric acid (sp. gr. 1.20) in a small pear shaped flask, evaporate to dryness, and heat pretty strongly over a Bunsen burner or a spirit lamp for about ten minutes. He then treats the contents of the flask exactly as a manganese ore, heating with sodium oxalate and hydrochloric acid, and measuring the resulting carbonic acid.

The apparatus he uses (which was devised for the purpose) is, he states, a modification of Scheibler's, but as a matter of fact has many advantages over that apparatus, excellent as it is. One very decided advantage is that it admits of heating the solution; and, altogether, it would be very valuable in a laboratory, where the accurate estimation of carbonates or the measurement of gases is frequently required.

As everyone, however, has not got the apparatus, I thought it would be advisable to show that the manganese could be determined some other way.

If it is admitted that MnO₂ can be easily formed, a number of methods immediately suggest themselves as being likely to give the amount of manganese, prominent among which is the well known method of treating with hydrochloric acid, and passing the resulting chlorine through a solution of iodide of potassium, the liberated iodine being titrated with sodium hyposulphite. (Frobenius, fifth edition, p. 135). Accordingly I tried that method, but although I took every care, and returned to it again and again, I completely failed to obtain accurate or even constant results. This seems strange (I may say that Mr. Parry had previously tried and failed also), and at first I attributed my failure to the fact that I was not getting MnO₂, but was afterward convinced that it is much easier to get that oxide than at first sight it appears. I can scarcely avoid coming to the conclusion that there is something wrong with this method of determining free chlorine.

The next method I tried proved in every way successful. I proceed exactly as Mr. Parry does (and find no difficulty in getting MnO₂). One gramme of the spiegeleisen is dissolved in nitric acid (sp. gr. 1.20) in a small round-bottomed flask, and evaporated to dryness. When dry the flask, which may be either a spirit lamp or a Bunsen burner, is turned, so that the bottom of the flask is cherry red for ten minutes. It is then allowed to cool very gradually.

At this point, instead of forming carbonic acid, I simply put into the flask a weighed quantity of ammonio-ferrous sulphate or ferrous sulphate of a known strength, and then heat with rather dilute hydrochloric acid. The contents of the flask very soon dissolve, but it is well to keep shaking the solution while it is being heated to prevent loss of chlorine. It only remains now to determine the iron left

unoxidized in order to arrive at the quantity of manganese, which can be done, of course, with potassium bichromate solution. If it is feared that the ferrous solution may get oxidized by exposure to the air, a small piece of marble put into the flask, which can also be fitted with a cork and tube, will readily prevent that.

In four successive experiments I obtained the following results:

| No. | Oxidized, p. c. | Equal to Manganese, p. c. | By Parry's Method, p. c. |
|-----|-----------------|---------------------------|--------------------------|
| 1 | 0.2108 | 19.82 | 20.16 |
| 2 | 0.2161 | 20.65 | 20.85 |
| 3 | 0.2346 | 23.51 | 23.75 |
| 4 | 0.2435 | 23.88 | 24.18 |

No. 2 gave by the acetate of ammonium method 20.55 per cent., which was done with great care. No. 4 is a repetition of No. 3.

It is evident, of course, that there is nothing original or new in the above method, but it contrasts very favorably with the usual methods of separating the iron with sodium or ammonium acetate, and precipitating the manganese from the filtrate with bromine. It is not at all troublesome, does not take long, and has the advantage that the only chemicals and apparatus required are those which are necessary for the assay of iron ores.

Eastern Pattern Cow Ties.

We illustrate herewith an improved cow tie, which J. Clark Wilson & Co., No. 81 Beekman street, have recently placed on the market, and which has been made to meet the wants of the Eastern trade, and with special view to security. It will be observed that an extension or knob has been formed on the open ring to prevent the same from drawing through the loop. This drawing through and closing up of the ring upon the stanchion is a fault which has been much complained of by farmers. The swivel also connects with the loop without any intervening link, thus greatly decreasing the danger of the animal getting his foot over it. The spring hook being made of malleable iron, is less liable to be straightened out than if made of wrought iron. In our issue of September 28th we published their price list for these goods, to which we refer our readers.

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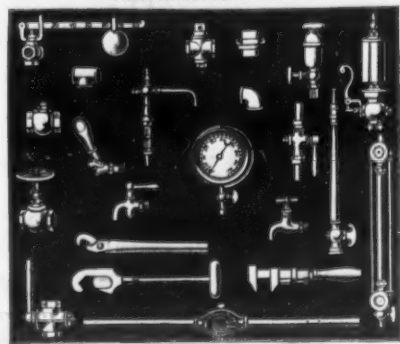
The Beginnings of Marine Insurance.

Marine insurance was first practiced in England, says the *Spectator*, by the merchants of the Steelyard. Where the trains of the South-eastern Railway rush into Cannon street, stood a mass of buildings known as the "Steelyard," inhabited in medieval times by a body of German traders. "The vast buildings," says Mr. Martin, "on the river side, as far as they did not serve as stores (store-houses?) for the immense quantities of merchandise collected within, were divided into separate cells, built only for single men, the whole opening out into common reception rooms." Among these traders there can be little doubt a system of marine insurance was in vogue, and these foreigners may be considered the first persons who regularly practiced it in this country. But in those, its earliest days, it was rather a species of mutual insurance than insurance as now understood. Nor does Mr. Martin neglect the important place which the legal side occupies in reference to the progress of marine insurance. He tells us how in the time of Elizabeth an attempt was made, after the departure from England of the Germans and Lombards, to found a Maritime Court, for the purpose of adjudicating upon causes arising "from policies of assurance." This court was to consist of fourteen commissioners, six of whom were to be professional lawyers, while the other eight were to be "grave and discreet merchants." But it does not appear that the merchants and underwriters in general had much confidence either in the lawyers or the discreet merchants, and this court was consequently almost useless. Perhaps the small success obtained by this innovation may to some extent serve as a warning against what are popularly known as tribunals of commerce, because this was essentially a commercial tribunal, in which the commercial element preponderated considerably over the legal, especially as two only of the judges were to be what is technically called "common lawyers." But coming down to more modern times, we find Mr. Edward Lloyd, an enterprising coffee house keeper, about 1688, located in Tower street. Like most of the other coffee houses in the city this was the resort of persons interested in trade and shipping. But to the individual energy of Mr. Lloyd in obtaining news and spreading it for the benefit of the frequenters of his establishment may be attributed the fact that Lloyd's became by degrees a species of Underwriters' Club, and thus, having once attained a corporate existence through good management and vast enterprises

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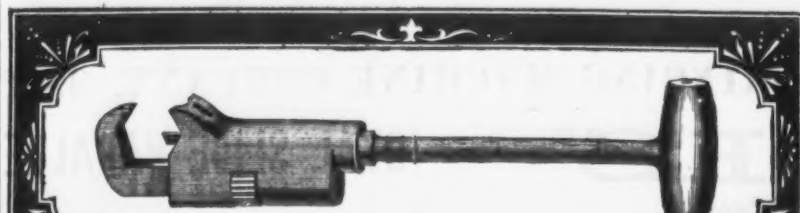
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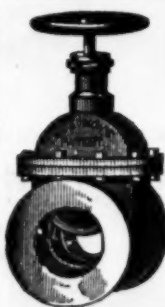
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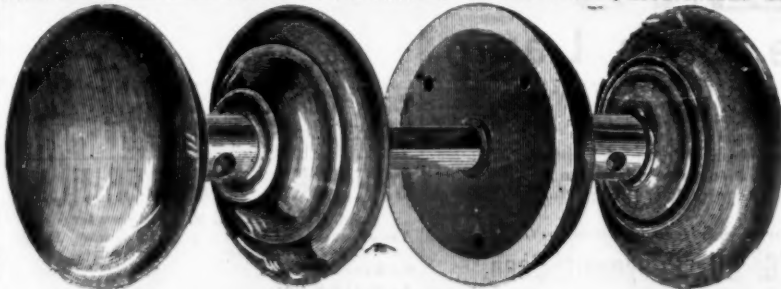
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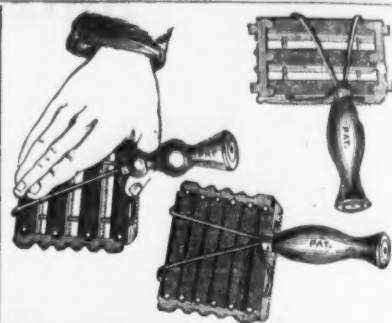
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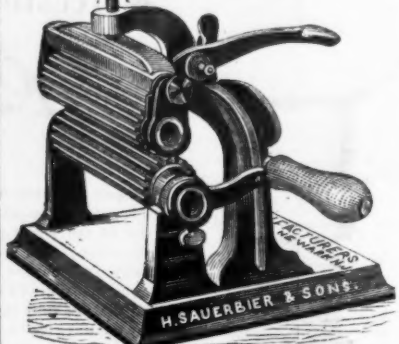
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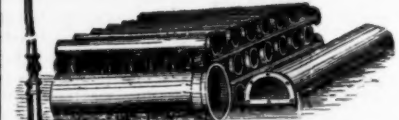
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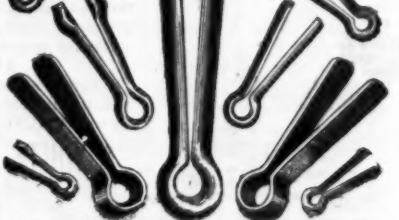
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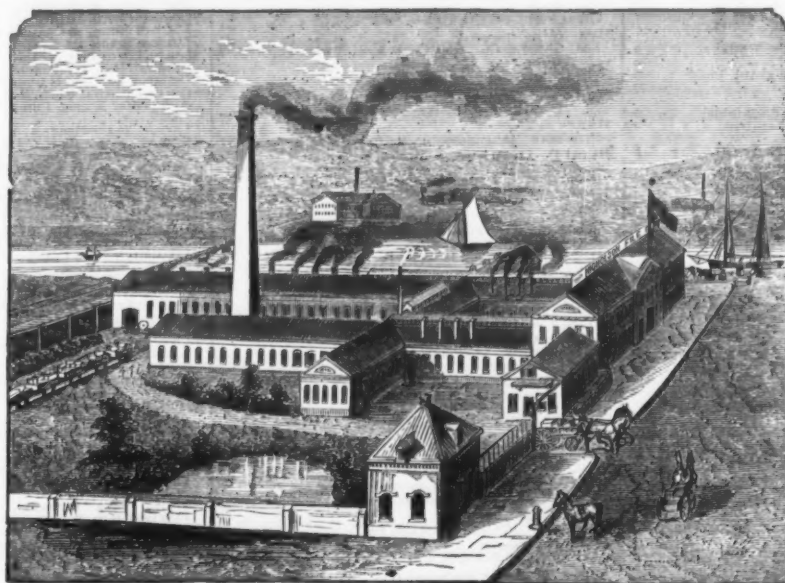
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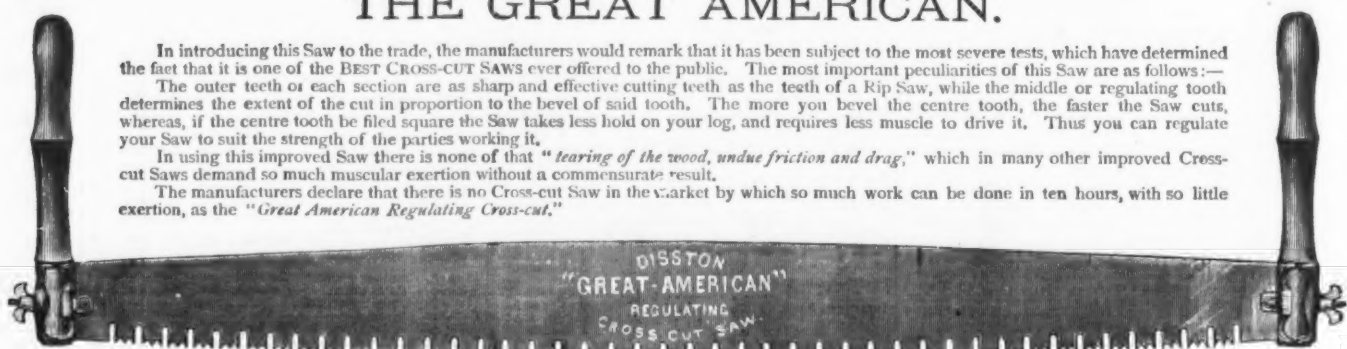
Keystone Saw, Tool, Steel and File Works.

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HENRY DISSTON & SONS, Hand, Panel and Rip Saws and Handled Saws OF EVERY DESCRIPTION.

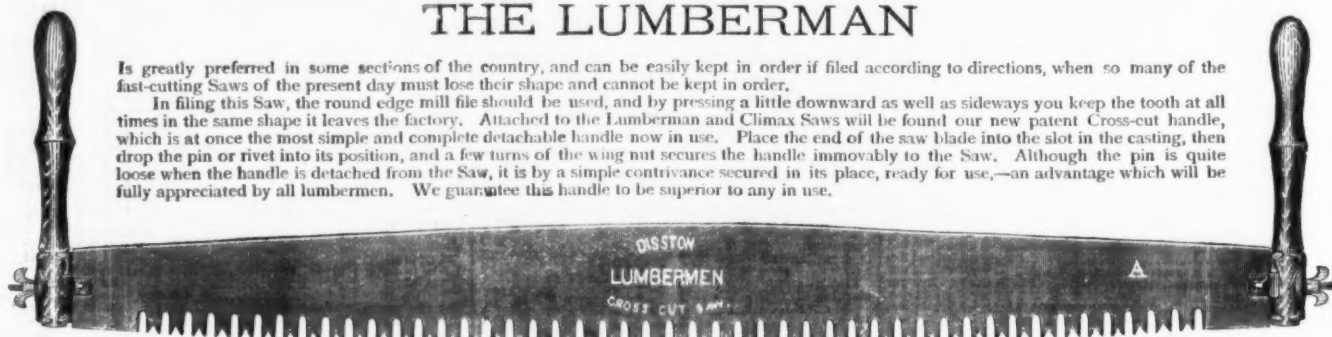
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—
The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the level of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.
In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



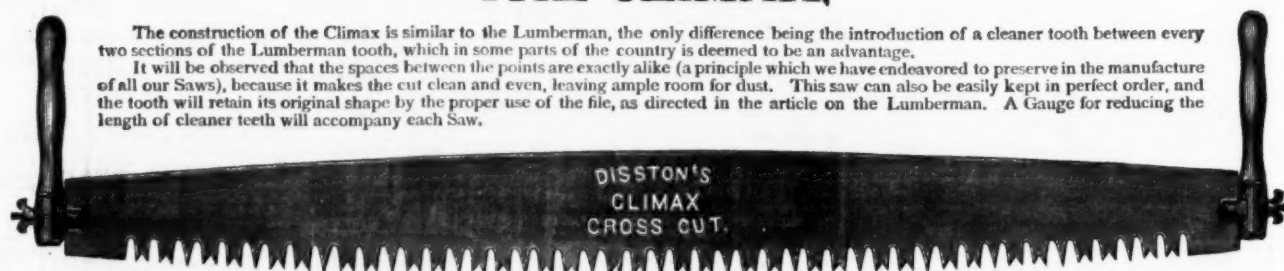
THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



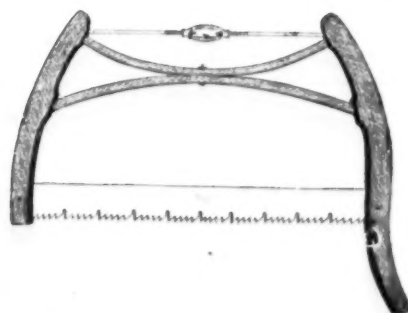
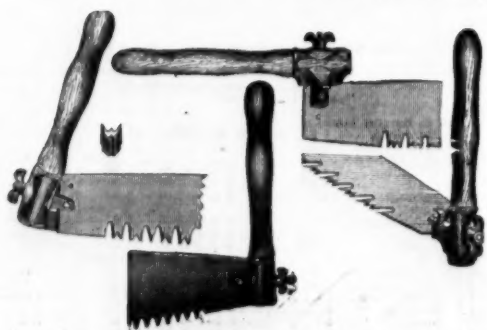
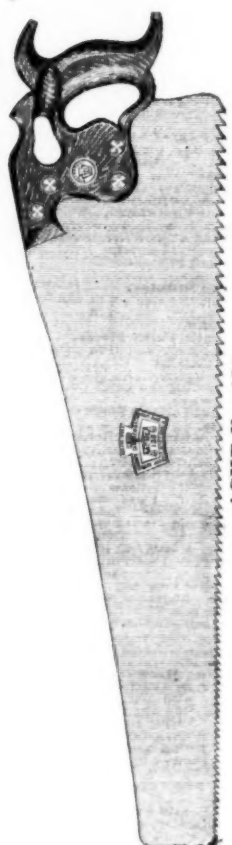
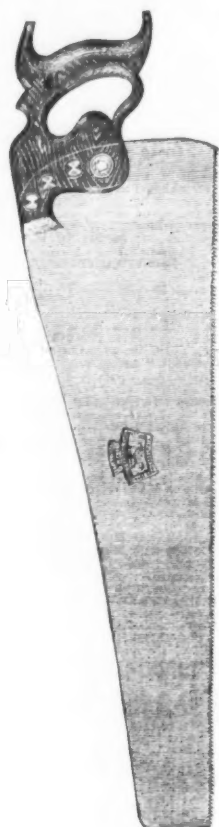
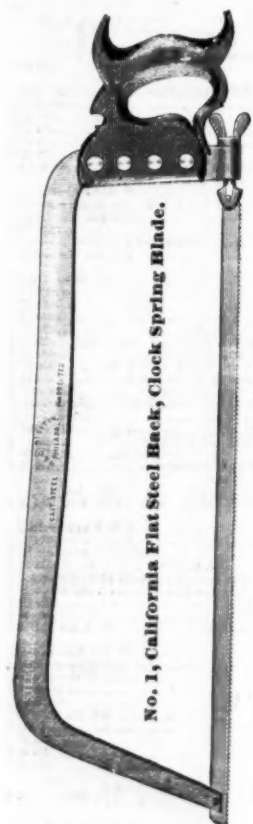
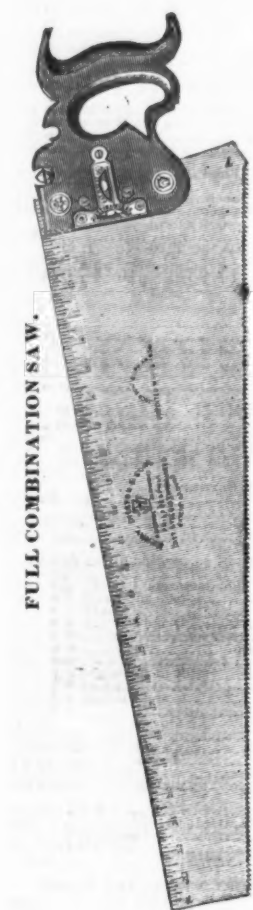
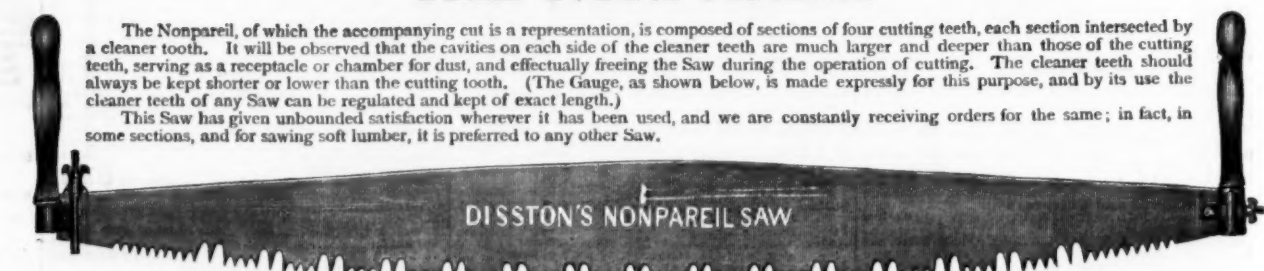
THE CLIMAX,

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting tooth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.



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| Bentley's Iron | dis 60 @ 60 1/2 |
| Wood, Beach | dis 60 @ 60 1/2 |
| Hickory | dis 60 @ 60 1/2 |
| Hand | dis 60 @ 60 1/2 |
| Hand Rail, Sargent's | dis 60 @ 60 1/2 |
| Hand Rail, Beckley & Co. | dis 60 @ 60 1/2 |
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| Scythes | |
| Blood's German Steel, Grass | dis 100 @ 100 |
| Cast | dis 100 @ 100 |
| Silver | dis 100 @ 100 |
| German | dis 100 @ 100 |
| Grain | dis 100 @ 100 |
| Cast | dis 100 @ 100 |
| Blood's Excelsior and Orange | dis 100 @ 100 |
| Young America | dis 100 @ 100 |
| Silver Clipper | dis 100 @ 100 |
| Wade's Iron | dis 100 @ 100 |
| Bush | dis 100 @ 100 |
| Sevthe Souths | dis 100 @ 100 |

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| Shovels and Saws | |
| Cast Iron | dis 100 @ 100 |
| Seymour's Saws | dis 100 @ 100 |
| Scissors | dis 100 @ 100 |
| Pruning | dis 100 @ 100 |
| Harvard's Lamp Trimmers | dis 100 @ 100 |
| Shovels | |
| Shilling, Door, M. W. & Co. list | dis 100 @ 100 |
| R. E. list | dis 100 @ 100 |
| Patent | dis 100 @ 100 |
| Hatfield's | dis 100 @ 100 |
| Russell's Anti-Friction | dis 100 @ 100 |
| Siding Shutter | dis 100 @ 100 |
| Sargent's List | dis 100 @ 100 |

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| Shovels and Spades | |
| Ames | dis 100 @ 100 |
| Lowland's | dis 100 @ 100 |
| Old Colony | dis 100 @ 100 |
| Middleboro Shovel Co. | dis 100 @ 100 |
| Dunham's Shovels and Spades | dis 100 @ 100 |
| Shovels and Tones | |
| Iron and Brass Head, R. E. list | dis 100 @ 100 |
| Har | dis 100 @ 100 |
| Polished Steel | dis 100 @ 100 |

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| Spikes | |
| North Carolina Handle Co. | dis 100 @ 100 |
| Spoke Shaves | |
| Dennance Metallic | dis 100 @ 100 |
| Iron | dis 100 @ 100 |
| Wood | dis 100 @ 100 |
| Bailey's | dis 100 @ 100 |

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| Spoke Trimmers | |
| Bailey's | dis 100 @ 100 |
| Seaward | dis 100 @ 100 |
| No. 1, \$1.00; No. 2, \$1.20 | dis 100 @ 100 |
| Douglas | dis 100 @ 100 |
| Spoons | |
| Tinned Iron | dis 100 @ 100 |
| By the case | dis 100 @ 100 |
| Birmingham | dis 100 @ 100 |
| Boardman's new list | dis 100 @ 100 |
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| Reed & Barton | dis 100 @ 100 |
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| Holmes, Booth & Haydens | dis 100 @ 100 |
| Nickel Silver Co. | dis 100 @ 100 |
| German Silver | dis 100 @ 100 |
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| Tables | dis 100 @ 100 |
| Tin (Coville Haw. Co.) | dis 100 @ 100 |

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| Per doz. | dis 100 @ 100 |
| Sticks and Dies | |
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| Axe Stone | dis 100 @ 100 |
| Slips | dis 100 @ 100 |
| Sand Stone | dis 100 @ 100 |
| Washita Stone | dis 100 @ 100 |
| Slips | dis 100 @ 100 |
| Arkansas Stone | dis 100 @ 100 |
| Slips | dis 100 @ 100 |
| Grindstones, Family, Loring's | dis 100 @ 100 |

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| Stove Polish | |
| Joseph Dixon's | dis 100 @ 100 |
| Gold Medal | dis 100 @ 100 |
| Rising Sun | dis 100 @ 100 |
| Squares | |
| Steel | dis 100 @ 100 |
| Full cases | dis 100 @ 100 |
| Nickel Plated | dis 100 @ 100 |
| Star Try Squares and Levels | dis 100 @ 100 |
| Plano's Try Squares No. 1 | dis 100 @ 100 |
| No. 2 | dis 100 @ 100 |
| Winterbottom's Try and Mitre | dis 100 @ 100 |

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| Tacks, Half Weight, American | dis 100 @ 100 |
| Full | dis 100 @ 100 |
| Carpet, Am. and Swedes | dis 100 @ 100 |
| Leather Head | dis 100 @ 100 |
| Copper | dis 100 @ 100 |
| Brads, Half Weight | dis 100 @ 100 |
| Shoe Nails | dis 100 @ 100 |
| Trunk, Clout and Finishing Nails | dis 100 @ 100 |
| Double Pointed Tacks | dis 100 @ 100 |

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| Tap Bore | |
| Common and Reg. | dis 100 @ 100 |
| Yves Tap Bore | dis 100 @ 100 |
| Enterprise Mfg. Co. | dis 100 @ 100 |
| Tea Tray | dis 100 @ 100 |
| American Tea Tray Co. | dis 100 @ 100 |
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| Case | dis 100 @ 100 |
| Patent | dis 100 @ 100 |
| Mouse | dis 100 @ 100 |
| Parent Cocker (Union) | dis 100 @ 100 |

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| Travels | |
| Lothrop's Brick and Plastering | dis 100 @ 100 |
| Diamond's Brick and Plastering | dis 100 @ 100 |
| Pence's Plastering | dis 100 @ 100 |
| Lothrop's Brick | dis 100 @ 100 |
| Bradley's Brick | dis 100 @ 100 |
| Worrell's Brick and Plastering | dis 100 @ 100 |
| Garden | dis 100 @ 100 |
| Triers | |
| Butter and Cheese | dis 100 @ 100 |
| Ventilators (Window) | |
| Nickel and Oil | dis 100 @ 100 |
| Solid Box, Trenton | dis 100 @ 100 |
| Wilson's | dis 100 @ 100 |
| Pat. Wright's | dis 100 @ 100 |
| Parallel, Parker's | dis 100 @ 100 |
| Wilson's | dis 100 @ 100 |
| Sargent's | dis 100 @ 100 |
| Trenton | dis 100 @ 100 |
| Backus and Union | dis 100 @ 100 |
| Merrill's | dis 100 @ 100 |
| Fisher & Norton | dis 100 @ 100 |
| Buttall | dis 100 @ 100 |
| Stevens | dis 100 @ 100 |
| Simmons' Adjustable | dis 100 @ 100 |
| Saw Filers, Bonney's | dis 100 @ 100 |
| Hopkins | dis 100 @ 100 |

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| Wheel Barrows | |
| Canal (Fugley & Chapman) | dis 100 @ 100 |
| Coal, Garden and Stone (Fugley & Chapman) | dis 100 @ 100 |
| Jacob's Pat. Self-Opening B. R. and Canal | dis 100 @ 100 |
| Well Wheels | |
| Revised list | dis 100 @ 100 |
| Wire | |
| Brass and Copper | dis 100 @ 100 |
| Bright and Annealed | dis 100 @ 100 |
| Convered | dis 100 @ 100 |
| Galvanized, Nos. 10 to 18 | dis 100 @ 100 |
| Thinned | dis 100 @ 100 |
| Cast Steel | dis 100 @ 100 |
| Tinned Broom Wire | dis 100 @ 100 |
| Galvanized Telegraph, Nos. 8 and 9 | dis 100 @ 100 |
| Galvanized Telegraph, Nos. 10 and 11 | dis 100 @ 100 |
| Annealed Fence, Nos. 4 and 5 | dis 100 @ 100 |
| Grape | dis 100 @ 100 |
| Fence Staples | dis 100 @ 100 |
| Staple Steel Wire | dis 100 @ 100 |
| Judd's Picture Wire | dis 100 @ 100 |
| Clothes Line Wire | dis 100 @ 100 |
| Wrenches | |
| American Adjustable | dis 100 @ 100 |
| Baxter's Adjustable "S" New List, May 1, 76 | dis 100 @ 100 |
| Diagonal | dis 100 @ 100 |
| Collins & Co. | dis 100 @ 100 |
| Cut genuine | dis 100 @ 100 |
| Pattern (Malleable) | dis 100 @ 100 |
| Diamond Hard Ware Co. | dis 100 @ 100 |
| Hall & Nelson's "Climax" | dis 100 @ 100 |
| Liberty's Patent | dis 100 @ 100 |
| Tat's Patent | dis 100 @ 100 |
| Davis' Patent | dis 100 @ 100 |
| Bemis & Co's Patent Combination | dis 100 @ 100 |
| Merrick's | dis 100 @ 100 |
| Allen's Pocket (Bright) | dis 100 @ 100 |

| | |
|-----------------------------|---------------|
| Wrenches | |
| Less than 2 doz | dis 100 @ 100 |
| Providence, with Cog Wheels | dis 100 @ 100 |
| Household, without | dis 100 @ 100 |
| Universal | dis 100 @ 100 |
| Kureka, without | dis 100 @ 100 |
| Novelty | dis 100 @ 100 |
| Sherman | dis 100 @ 100 |
| Reliance, without | dis 100 @ 100 |
| Excelsior Bench Wrenches | dis 100 @ 100 |
| For Set Tubs | dis 100 @ 100 |
| Crown No. | dis 100 @ 100 |

| | |
|--------------------------------|---------------|
| Stamped Tin Ware | |
| Common Stamped Ware | dis 100 @ 100 |
| Stamped Deep and Retailed Ware | dis 100 @ 100 |
| Isolated Tin Ware | dis 100 @ 100 |
| Plated Tin Ware | dis 100 @ 100 |

METALS.

| | |
|--|---------------|
| IRON.—DUTY Bars, 1 to 1 1/2 cents per lb. Sheet, Band, Hoop and Scroll, 1 1/2 to 1 3/4 cents per lb. Provided that none of the above iron shall be less than 30 per cent. duty than 30 per cent. Fig. 87 per ton; Polished Sheets, 3 cents per lb.; Wrought Scrap, 80 per cent; Cast Scrap, 60 per cent; Rolled, 70 per cent; 100 lbs. Roller and Plate, 1 1/2 cents per lb. | |
| Pig Iron—AMERICAN. | |
| Foundry No. 1 | dis 100 @ 100 |
| Foundry No. 2 | dis 100 @ 100 |
| Gray Forge | dis 100 @ 100 |
| SCOTCH. | |
| Cast | dis 100 @ 100 |
| Forged | dis 100 @ 100 |
| English | dis 100 @ 100 |
| Am. Reduced, at mill | dis 100 @ 100 |

| | |
|-----------------------------------|---------------|
| RAILS. | |
| American, at tide water, currency | dis 100 @ 100 |
| Old Rail | dis 100 @ 100 |
| Scrap | dis 100 @ 100 |
| Wrought Scrap, from yard | dis 100 @ 100 |
| Bar Iron from Store. | |
| 1 to 2 in. round and square | dis 100 @ 100 |
| 2 to 4 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 4 to 6 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 6 to 8 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 8 to 10 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 10 to 12 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 12 to 14 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 14 to 16 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 16 to 18 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 18 to 20 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 20 to 22 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 22 to 24 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 24 to 26 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 26 to 28 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 28 to 30 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 30 to 32 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 32 to 34 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 34 to 36 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 36 to 38 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 38 to 40 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 40 to 42 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 42 to 44 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 44 to 46 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 46 to 48 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 48 to 50 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 50 to 52 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 52 to 54 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 54 to 56 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 56 to 58 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 58 to 60 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 60 to 62 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 62 to 64 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 64 to 66 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 66 to 68 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 68 to 70 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 70 to 72 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 72 to 74 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 74 to 76 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 76 to 78 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 78 to 80 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 80 to 82 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 82 to 84 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 84 to 86 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 86 to 88 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 88 to 90 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 90 to 92 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 92 to 94 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 94 to 96 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 96 to 98 in. x 1/2 to 1 in. | dis 100 @ 100 |
| 98 to 100 in. x 1/2 to 1 in. | dis 100 @ 100 |

| | |
|--------------|---------------|
| Sheet Iron. | |
| Common | dis 100 @ 100 |
| American | dis 100 @ 100 |
| R. G. | dis 100 @ 100 |
| No. 10 to 20 | dis 100 @ 100 |
| 21 to 24 | dis 100 @ 100 |
| 25 to 28 | dis 100 @ 100 |
| 29 to 32 | dis 100 @ 100 |
| 33 to 36 | dis 100 @ 100 |
| 37 to 40 | dis 100 @ 100 |
| 41 to 44 | dis 100 @ 100 |
| 45 to 48 | dis 100 @ 100 |
| 49 to 52 | dis 100 @ 100 |
| 53 to 56 | dis 100 @ 100 |
| 57 to 60 | dis 100 @ 100 |
| 61 to 64 | dis 100 @ 100 |
| 65 to 68 | dis 100 @ 100 |
| 69 to 72 | dis 100 @ 100 |
| 73 to 76 | dis 100 @ 100 |
| 77 to 80 | dis 100 @ 100 |
| 81 to 84 | dis 100 @ 100 |
| 85 to 88 | dis 100 @ 100 |
| 89 to 92 | dis 100 @ 100 |
| 93 to 96 | dis 100 @ 100 |
| 97 to 100 | dis 100 @ 100 |

| | |
|--|-----------------|
| 1 to 6 in. x $\frac{1}{2}$ and 5-16, and 1 to 6 in. x $\frac{1}{4}$ to 3.. | dis 2-7c |
| Rods— $\frac{1}{2}$ and 11-16 round and square..... | dis 2-6c |
| Bands—1 to 6 x 12 to 3-16..... | dis 2-9c |
| Wedjah Iron. | |
| Ordinary sizes..... | 130 00 @ 132 50 |
| Plow size..... | |

Sheet Iron.

Common

American.

R. G.

American.

Steel.

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Potter & Hoffman, Philadelphia, Pa.
Geo. Dunbar & Co., Boston, Mass.
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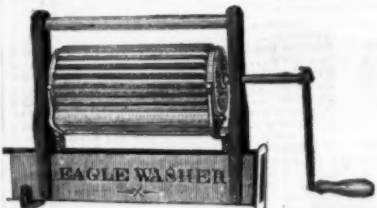
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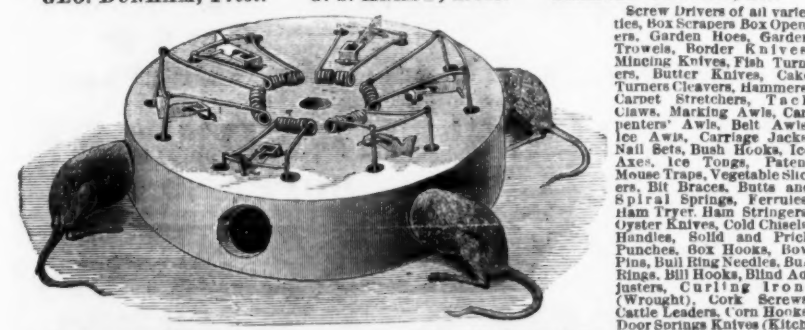
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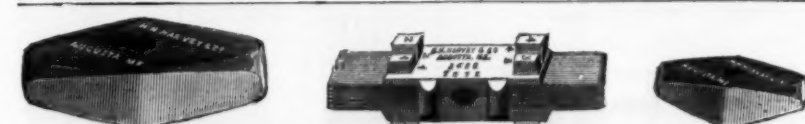
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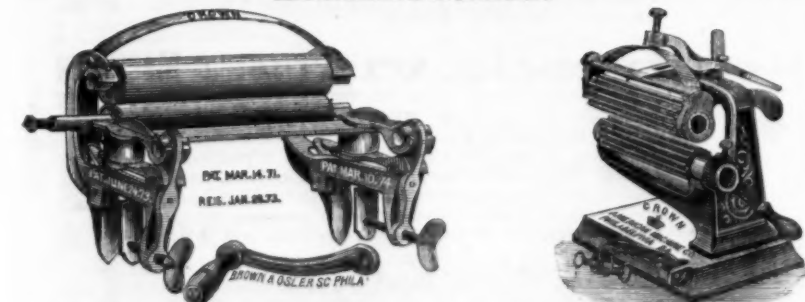
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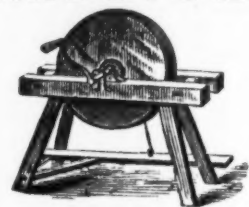


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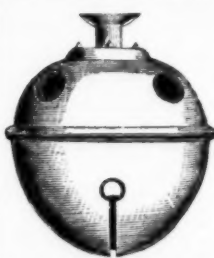
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Choppers, Hand and Power,

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Warranted thoroughly made as

the BEST IN USE.

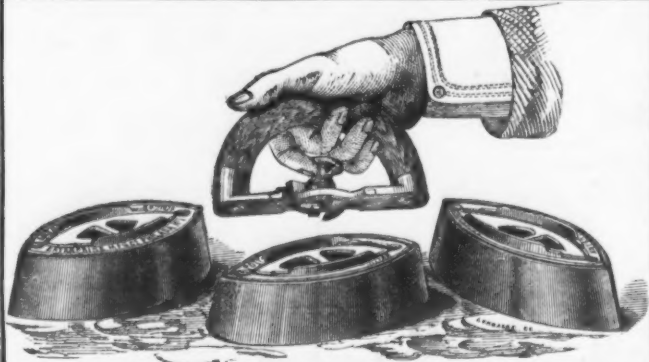
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(IMPROVED.)COFFEE, DRUG & SPICE MILLS, MEASURING FAUCETS,
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PRESSERS, CHEESE KNIVES, TOBACCO
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FILES AND HORSE RASPS.
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ESTABLISHED 1830.

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TRIMMINGS, CARRIAGE,
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No. 110. 7 1/2-2 Inches Long, 1 3/4 Inch Cutter, \$9.00 per dozen.

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A. G. COES
PAT. DEC. 26, 1871.

Established in 1839.

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COES'

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NEW PATENT
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23, 1871), May 2, 1871, and Dec.
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either will be rigorously pro-
secuted.We call particular attention to
our new Patent Ferrule, with its
Supporting Nut (shown in section
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the strongest Ferrule fastening
known.**A. G. COES & CO.**

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BRUSHESOF ALL KINDS,
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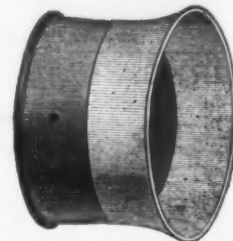
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STEP LADDERS.Manufacturer of and Dealer in all descriptions of
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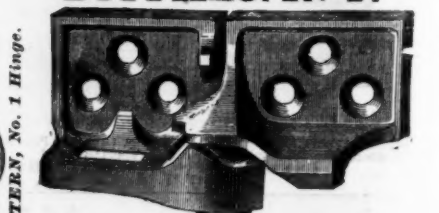
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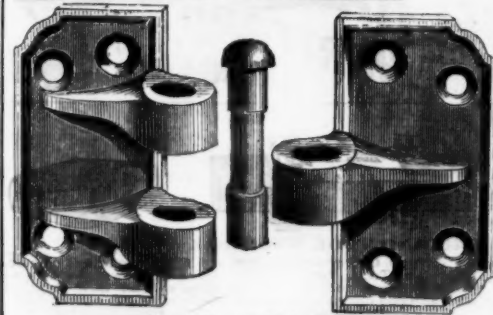
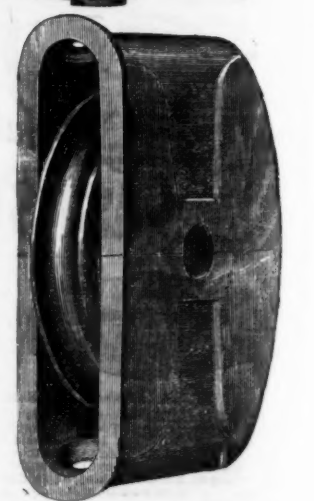
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NEW PATENT, No. 1 Hinge.

Design Patented Jan. 11th, 1876.

No. 1 Upper Gate Hinge.
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SOLID BOX VISES.

With or without Convex and Concave Washers.

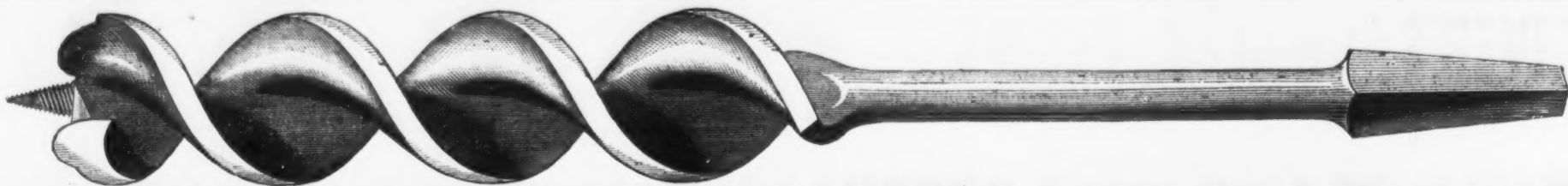
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Heads and Screws, Parallel Bench Vises, Sash Pullies, Ho-
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Gridirons, Drill Stocks and Bows, Box Chisels, Rivets,
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The front or working faces of these Augers and Bits are Concave, and the rear faces are Convex. This peculiar construction reduces friction in boring, prevents clogging, and enables the operator to do more work with less effort than with any other Auger or Bit now in use. They do not require to be withdrawn for clearance of chips while any part of the twist is outside the surface of the wood. Correspondence and orders solicited. These goods are *Solid Cast Steel*, and superior to any in the market. For sale to dealers at standard list, with usual discounts. Manufacturers supplied with machine Bits (spur lip for cross, or curved lip for end boring) of any length of twist required.

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There has long been a want of some device by which the straightening of shafting could be done without removing the work from the centers, and at the same time do it quickly and accurately. The

SCOFIELD PATENT SHAFT STRAIGHTENER meets just such a want: the apparatus is light and can be easily handled, yet it is of sufficient strength for the purpose required. It can be placed upon the shears of the lathe, and moved along the entire length of the work. It is especially

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Adapted for Line and Counter-Shafting, without necessitating the time and trouble of removing hangers and detaching couplings, but can be

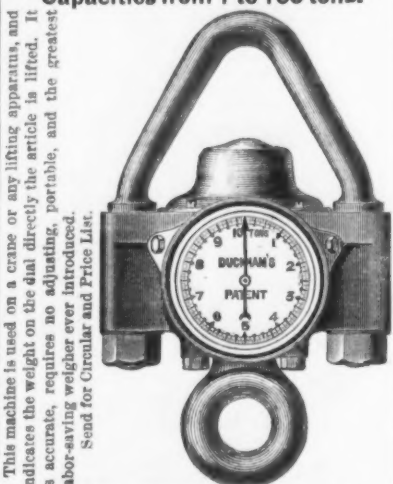
Easily applied to the Shaft while in Position. It can also be used on the bench for short lengths.

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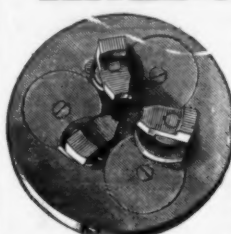


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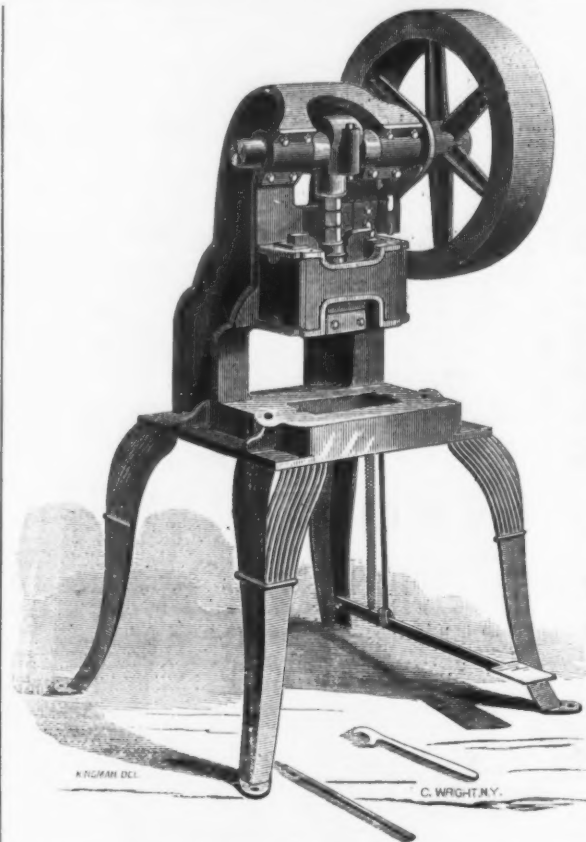
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We invite attention to the superior construction of this chuck. Its working parts are absolutely protected from dirt and chips. It is strong, compact and durable, and will hold the greatest variety of work, as the jaws are adjustable with a range the full diameter of the chuck. For Price List address,

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Arranged for Removing Work from the end of top roll.

COMBINED
Punching and Shearing Machines, Single Power Punching Machines with Shearing Attachments, Rotary Shearing Machines, Steam Riveting Machines, "Atherton's" Patent "Cam," Steam Engines, Hair Picking Machines and **MACHINERY** in general.

We would call special attention to the above engine, as it has the same leverage on the driving shaft as every point of the stroke that the "crank" has at its strongest point, making a smoother running as well as a more powerful engine.

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CENTENNIAL SPACE, SECTION C. 3, COLUMNS 25 & 26, MACHINERY HALL.

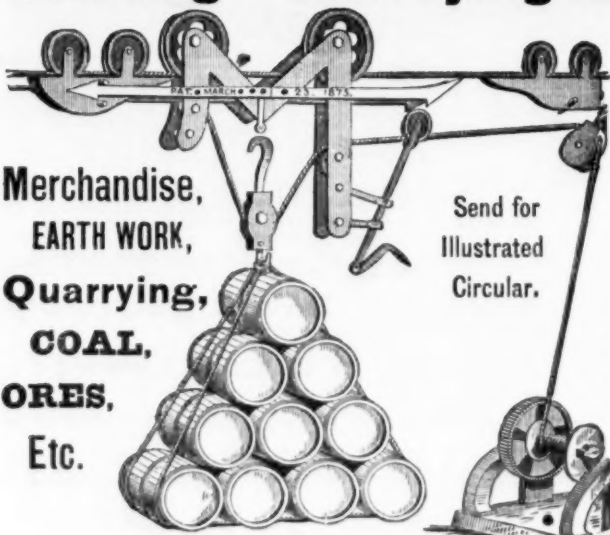
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One-Horse Power, with tubular boiler complete, only...\$150.
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These Machines are Automatic, combining simplicity, general utility, and great facility in their working. Weighing apparatus can be attached to the machine and will weigh without cost.

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We use five machines most of the time, storing 200 tons in 10 hours with each machine and one man, at a cost of three cents per ton. When using three machines the cost is 15 cents per gross ton.

BLACK IRONWORKS, Pittsburgh, Pa.
The Hoisting and Conveying Machine suits us; we cannot say too much in its favor.

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The Old Reliable Pioneer Poke.

The only Poke made with an oil tempered Cast Steel Spring. Our Pokes are manufactured under the personal supervision of the proprietors themselves, from the very best selected Oak and Hickory Timber, and finished in the very finest style. We warrant our goods to be first-class in every respect. For further particulars and price please address

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ESTABLISHED 1852.

JOSEPH CHURCHYARD,
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SASH, BLINDS DOORS,
Cisterns, Tanks, Stairs, Hand Rails, Newels, Mirror Frames, Mantels, Curtain Cornices, Book Cases, Veneered Doors, Mouldings, and complete interior and exterior finish for houses.

ROUGH AND PLANED LUMBER,
Flooring, Siding, Shingles, Lath and Fence Posts.

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Manufacturers of all kinds of

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One of the Strongest, can be run with or without water, and will not glaze under any circumstance. Can be seen in operation in Annex No. 1 to Machinery Hall, Centennial Buildings.

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HAMMERED AND FINISHED HORSE NAILS.

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Recommended by over 20,000 Horse Shoers.

All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

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TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others. If, after a fair trial, it does not, we will take it off at our own expense.

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ALSO,
**SHIVE'S PATENT WATCHMAN'S
CLOCK AND DETECTOR,**

AND
Buoy's Patent Counter Scale,
No Nest of Weights.

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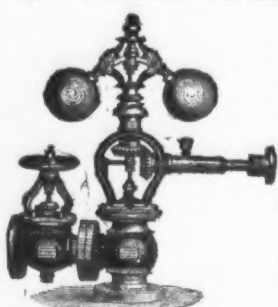
THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

Reduced Price List,

JANUARY 25th, 1876.

For dimensions of Governor, see Illustrated Price List.



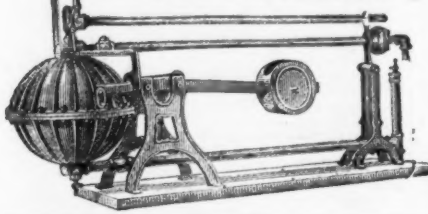
THE JUDSON PATENT
Improved Steam Governor.

| Size, Inch. | Full. Bright Fitted. | Extra for Lower. | Stop Valve. |
|----------------|----------------------------|------------------------|----------------|
| 1 | \$17.00 | \$19.00 | \$1.00 |
| 1 1/2 | 19.00 | 21.00 | 1.00 |
| 2 | 21.00 | 24.00 | 2.00 |
| 2 1/2 | 25.00 | 28.00 | 2.25 |
| 3 | 29.00 | 33.00 | 2.50 |
| 3 1/2 | 35.00 | 40.00 | 2.75 |
| 4 | 42.00 | 48.00 | 3.00 |
| 4 1/2 | 45.00 | 51.00 | 3.50 |
| 5 | 49.00 | 56.00 | 3.75 |
| 5 1/2 | 55.00 | 63.00 | 4.25 |
| 6 | 64.00 | 73.00 | 4.50 |
| 6 1/2 | 74.00 | 84.00 | 5.00 |
| 7 | 86.00 | 97.00 | 5.50 |
| 7 1/2 | 94.00 | 106.00 | 6.00 |
| 8 | 112.00 | 125.00 | 6.50 |
| 8 1/2 | 125.00 | 138.00 | 7.00 |
| 9 | 150.00 | 165.00 | 8.00 |
| 9 1/2 | 185.00 | 202.00 | 9.00 |
| 10 | 205.00 | 225.00 | 10.00 |

No Charge for Boxing & Cartage.

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The Albany Steam Trap.



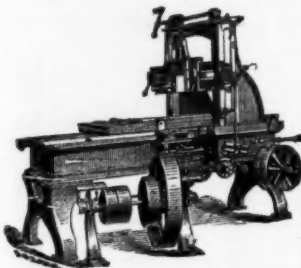
This Trap automatically drains the water of condensation from *Heating Coils*, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company,
Albany, N. Y.

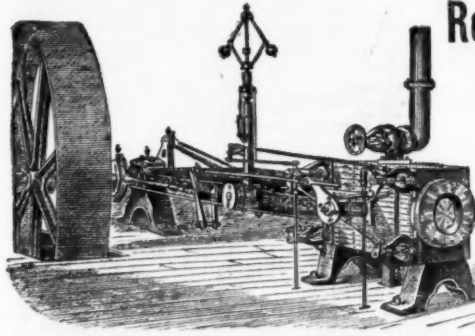
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Have constantly on hand and making

Drop Hammers



Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



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**Corliss Engine
BUILDERS.**

Shafting & Gearing,
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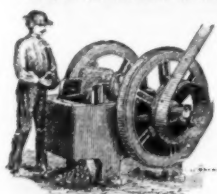
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PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
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MULTIPLE DRILLS. 2 to 20 Spindles.
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HAND DRILLS. CAR BOX DRILLS.
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New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS. It is extensively in use in MINING operations, for crushing

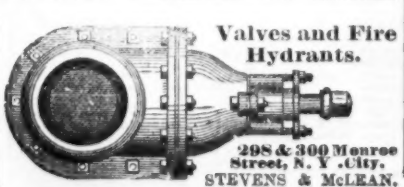
IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barites, Manganese, Phosphate Rock, Plaster, Soapstone, &c.
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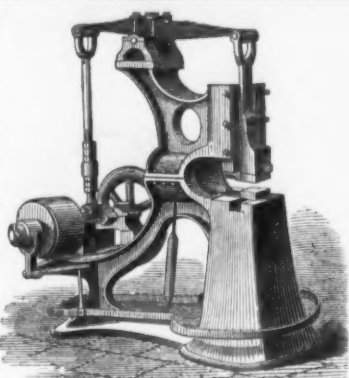


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298 & 300 Monroe St.,
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AGENTS.

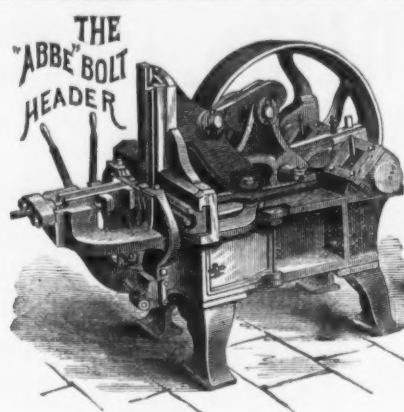


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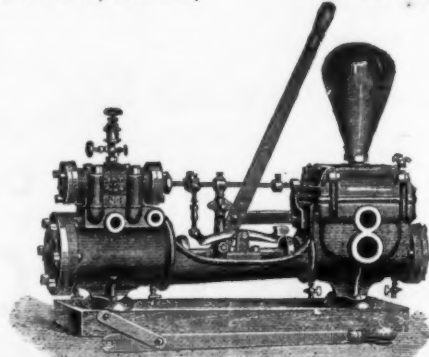
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WAREHOUSES:

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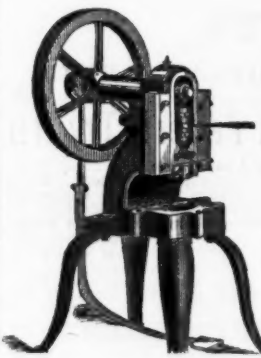


Cut above represents regular Boiler Feed Pump, No. 3 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

FIRE PUMPS a specialty.

Mining Pumps (both Double Acting Plunger, and Piston Pattern), which we guarantee to run absolutely noiseless on any lift from 100 to 600 ft., at a single lift, a specialty. Pumps for every possible duty. Prices as low as any, and our workmanship and material altogether the Best.

Every machine furnished under a complete guarantee.



A. H. MERRIMAN,
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Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

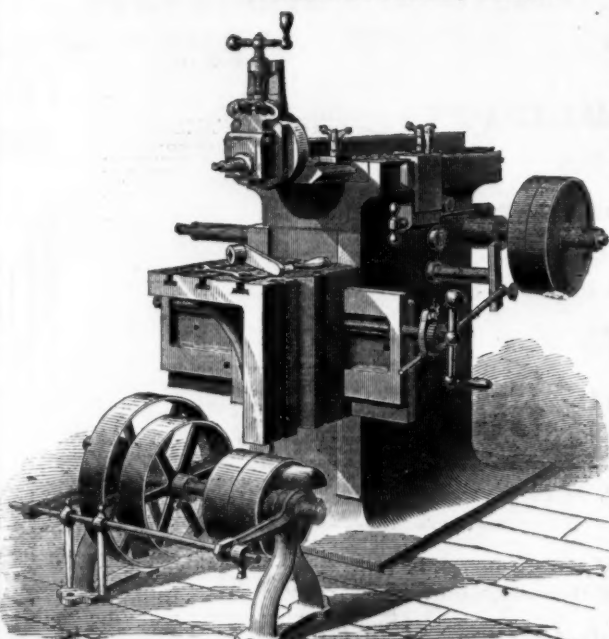
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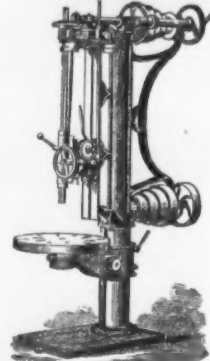


Any length of stroke from 3/4 to 24 inch in length, while machine is running with perfect uniformity of speed of cutting tool. Automatic cross feed of 19 inch and 16 inch, from top of table to bottom of slide when table is down. Send for Circular and Price List.

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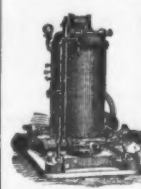
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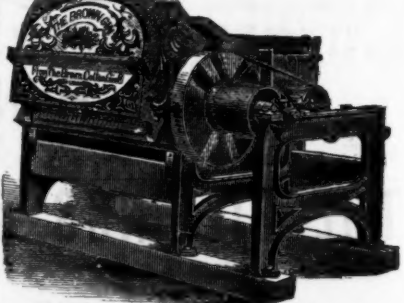
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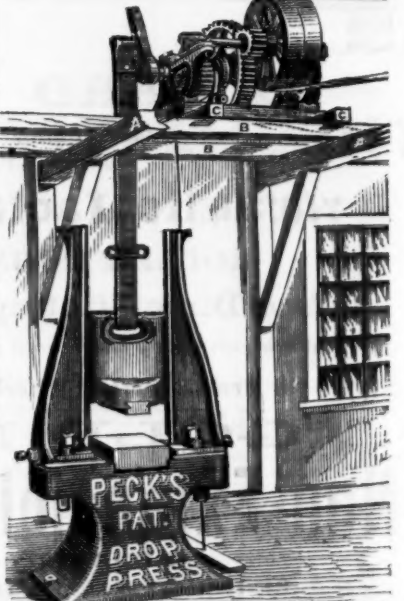
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Cotton Gin Saws, Ribs and other Gin materials. Also

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WHY THE BEST:

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THE
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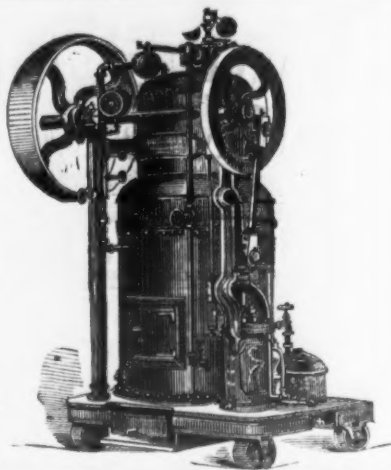
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\$200.00.

Cheaper than any Engine offered of the same capacity.

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Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and Mill Work generally.



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CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or Composition Metals.

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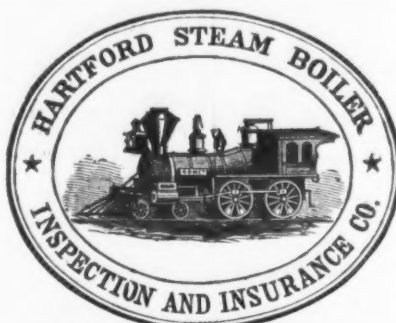
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The Business of the Company includes all kinds of STEAM BOILERS

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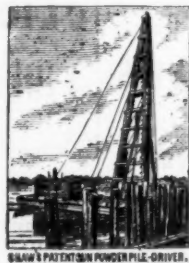
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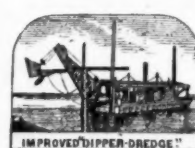
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STEAM PILE-DRIVER.



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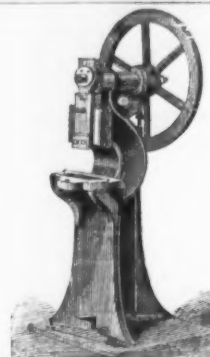
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Offices, No. 10 South Delaware Ave., Philad'a.

Machinery, &c.



REPORT OF JUDGES

In Department V, Group 3, at the 44th

Exhibition of the

AMERICAN INSTITUTE,

Held in the City of New York, Oct., 1875.

No. 318, Drawing, Drop &
Punching Presses.

THE STILES & PARKER PRESS CO.,
Of Middletown, Conn.

The machinery exhibited by these makers is of a character that calls for special commendation. In addition to their well known punching presses, to which a new feature has been added in a press adjustable to an inclination for discharging work left above the die, there are exhibited by them a combined punch and shears, a drawing or blanking press, and a drop.

In all these there is shown the highest mechanical culture, applied to meet every practical requirement, to avoid every practical difficulty, and to enlarge the range of application of the machines, by devices which are at once simple, elegant, and effective. Your committee would unhesitatingly recommend for this exhibition the "Medal of Progress," but find such award debarred by the rule of the Institute, forbidding such award unless a Silver Medal has been previously awarded. We, therefore, respectfully recommend the award of a Silver Medal.

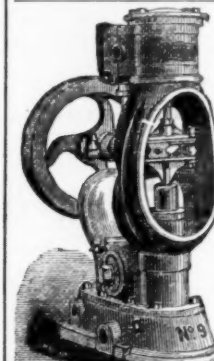
Silver Medal Awarded.
A true copy from the Report on file.
JOHN W. CHAMBERS, Sec'y.

AQUOMETER
Steam Pump.

Highest Premium awarded by
Franklin Institute, 1874,
For Simplicity, Economy of
Construction & Efficiency.

An absolutely Durable, Cheap, Efficient and Eco-
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AQUOMETER STEAM PUMP CO.,
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Send to us for Catalogue.
Valley Machine Co.

EUREKA SAFETY POWER!

Practically impossible to
explode. Tested to 30 lbs
pressure per square inch. Will
lift 2 inch seasoned oak—grinds
bushels Corn per hour. Price
\$250. Also, Stationary Engines
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THE HARTFORD FOUNDRY AND MACHINE CO.,

Successors to the

WOODRUFF & BEACH IRON WORKS,
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High & Low Pressure Marine & Stationary

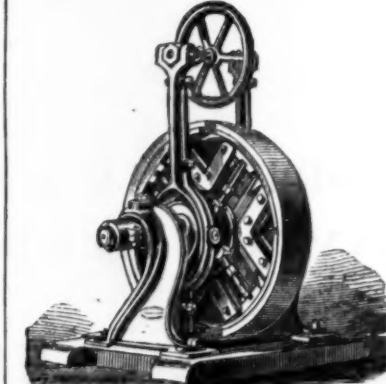
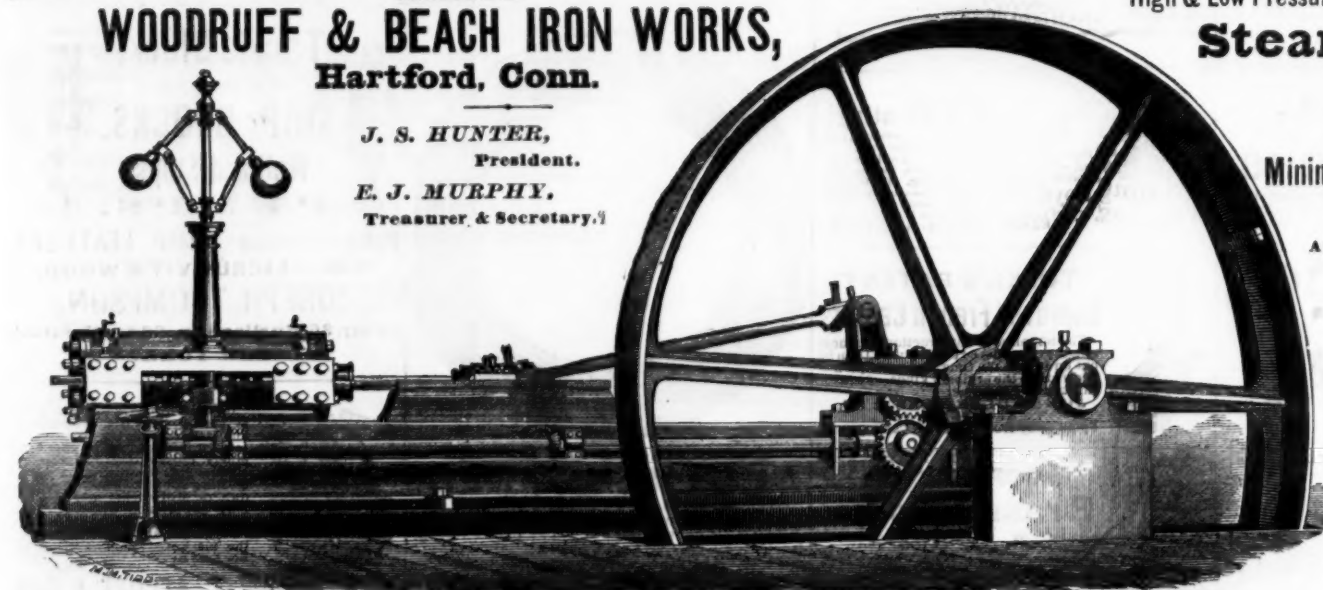
Steam Engines

AND

Boilers,
Mining, Powder and Paper Mill
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And every Variety of Iron and Com-
position Castings made
to order.

The following are a portion of the
Engines manufactured at these works
and are a sufficient guarantee of our
capacity for doing first-class work.
viz.: The Pumping Engines in the
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Mo. and Hartford, Conn. and in the
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Navy Yards, and the engines in the
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Friction Clutches

For Connecting Shafting and Gearing.

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| XXX Genuine..... | 40c | C..... | 20c |
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"Note."—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

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MADE EXCLUSIVELY FROM

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Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.
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RE-ROLLED NORWAY SHAPES.
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**IRON CLAD
FIRE SHOVEL**

We call the attention of the trade to our **New Stove or Fire Shovel.** It is far superior to anything in the market, for the following reasons:

It is made from one piece of Metal, both blade and handle; therefore it is as cheap as the cheapest. There being no corrugations to catch dirt, it is always clean.

The handle being half round at the junction of the blade makes it the strongest Shovel ever manufactured, (where all other Shovels fail.)

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P. S.—We have noticed a circular issued by the *East River Sheet Metal Mfg. Co.*, informing the Trade that there are parties manufacturing a Fire Shovel made in one piece and corrugated at or near the junction of handle and blade, "upon which they hold a patent." We do not know to whom they refer, but if to us we wish to say that we manufacture our Shovel under Letters Patent of the U. S. granted to us and we guarantee all parties purchasing goods from us against all loss or damage, by infringements of every kind and nature.

IRON CLAD CAN CO.,

Manufacturers of **STAMPED WARE, CAN TRIMMINGS, COAL HODS, Etc.**
Send for Price List.

Edgar's Patent "Gem" & "U. S." Stove Shovels.

PLAIN SOLID HANDLE,
Patented Nov. 3, 1874.

IMPROVED OVAL HANDLE,
Patented Jan. 5, 1875.

ENTIRELY ROUND HANDLE, Patented Feb. 22, 1876.
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They are plated by weight, and not by time or guess, containing 50 per cent. more silver than the usual standard, on a base of Nickel. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring them that the high standard already attained, shall be maintained. Send for Catalogue and Price.

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POINTED READY FOR DRIVING.

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Castings for Cars, Mills and Machinery. Also supplied in Ingots to the trade. Guaranteed to be the safest and most durable Journal Metal made.
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Light and Heavy **STEEL CASTINGS** of superior quality made on short notice, true to pattern, solid, strong and durable, can be readily forged and tempered.

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"Sligo" Fire Box Iron, Boiler Plate,
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"Tyrone" Brand of Bar, Tank & Sheet
Iron, Girder and Ship Plates, Angle
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Plates Rolled 100 inches wide.
OFFICE AND MILLS,
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Sligo Stay Bolt Iron, Warranted Unexcelled.
BOILER HEADS & FLUE HOLES
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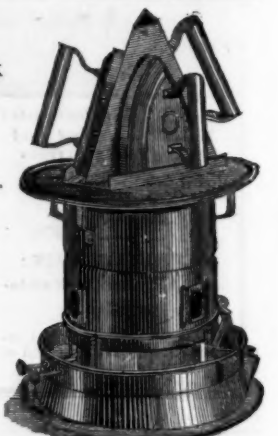
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For Winter Doors Use Nos. 1 and 2.
WARRANTED BEST CAST STEEL.
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Oil Cook Stove.
FOUR SIZES.
Suitable for all purposes, for Cooking, Baking and Ironing.



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Of all Description.
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